Environmental Restoration Project
Draft Long-Term Environmental Stewardship Plan

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Albuquerque, New Mexico
in Association with
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Kirtland Area Office

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FOREWORD

Within the U.S. Department of Energy (DOE), environmental stewardship has become an expression describing the long-term activities that will be conducted on a site after closure. These include operation and maintenance of engineered barriers, monitoring, access restrictions, security, government controls, land use controls, information management, and the needed funding to support these activities. Within each of these categories reside a number of important themes and issues. This initial Kirtland Area Office/Sandia National Laboratories/New Mexico Long-Term Environmental Stewardship (LTES) Plan examines these themes and issues.

"Stewardship" has developed a number of definitions as it has evolved through the federal government in recent years. But, the word's root is found in the Middle English, implying a meaning of "to watch out for" or "to manage," with a philosophical underpinning denoting "responsibility."

One of the first questions to arise from such a definition, for example, is: how long is long-term? Various organizations within the energy department and various orders have suggested answers ranging from 70 up to 10,000 years. One organization has used 10 half-lives of Cesium-137 (just more than 300 years), another a length convenient to a popular spread sheet employed for tracking costs (70 years.) Others have suggested and begun to use the Native American standard of seven generations. In our LTES Plan, the answer to this and other questions is not completely resolved. Instead, we answer that our plan will be in place *as long as is necessary*. It will be revisited regularly and revised to meet changing conditions and new requirements.

For a document designed to last "*as long as is necessary*," the reader will perhaps find this plan sparing in its length. This is because much of the detail needed to execute an LTES plan is not included here. Instead, the detail is referred to in other documents, which tier down from the plan itself. As a first step, this plan makes use of existing capabilities and programs to meet its goals. Only then are new measures or changes described in order to complete this important work..

Finally, an LTES plan is a community plan. It cannot simply be "approved" within a DOE system and set into motion. If it is not a plan of, by and for the community, it will fail. In the case of our closure operations, the stakeholders are many—on and outside of the Kirtland Federal Complex. In recognition of that, this plan has been preceded by more than 18 months of meetings and recommendations from a variety of stakeholders, who have given tirelessly to this process. Unresolved issues will be the subject of still more stakeholder sessions. A variety of efforts to continue to reach out and involve the community, will be a part of our LTES strategy.

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ACRONYMS AND ABBREVIATIONS

BRAC	Base Re-Alignment Commission
BLM	Bureau of Land Management
CAB	Citizen Advisory Board
CAMU	Corrective Action Management Unit
CEARP	Comprehensive Environmental Assessment and Response Program
CEM	Community Environmental Monitoring
CWL	Chemical Waste Landfill
DOD	Department of Defense
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOE/HQ	DOE Headquarters
EGIS	Environmental Geographic Information System
EM	Environmental Management
EMP	environmental monitoring plan
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERDMS	ER Database Management System
ES&H	Environment, Health and Safety
FY	fiscal year
GIS	Geographic Information System
GWPP	Groundwater Protection Program
HSWA	Hazardous and Solid Waste Amendments
HWB	Hazardous Waste Bureau
IC	Institutional Control
IMS	Information Management System
IRT	Inactive Record Transfer
ISS RC	Integrated Safety and Security Records Center
KAFB	Kirtland Air Force Base
KAO	Kirtland Area Office
KFC	Kirtland Federal Complex
LTES	long-term environmental stewardship
LTM	Long-Term Monitoring
MOU	Memoranda of Understanding
MWL	Mixed Waste Landfill
NFA	No Further Action
NMED	New Mexico Environment Department
RCRA	Resource Conservation and Recovery Act
SEM	Site Environmental Monitoring
SHEARS	Safety, Health and Environmental Automated Records System
SNL/NM	Sandia National Laboratories/New Mexico
SOWG	Stewardship Outreach Working Group
SWMU	Solid Waste Management Unit
TA	technical area
TLD	thermoluminescent dosimeter
TOX	total organic halogens
USAF	U.S. Air Force
USFS	U.S. Forest Service
VOC	volatile organic compound

1.0 INTRODUCTION: LONG-TERM ENVIRONMENTAL STEWARDSHIP

Long-term environmental stewardship (LTES) is a concept that involves the protection of natural, cultural, and human resources (which together is construed as the "environment") with help from a variety of institutions and individuals within a community. It is not an effort that can be performed in isolation.

At Sandia National Laboratories/New Mexico (SNL/NM), LTES refers to all activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization work at an environmental site or any portion of a site[1]. This plan pertains to LTES for SNL/NM's **Environmental Restoration (ER) Project.** (Any term shown in **bold** in the text can also be found in the glossary of this document.)

It is important to address LTES for a number of reasons, as follows:

- Technical, financial, and management considerations for LTES may impact decisions made during the actual remediation phase.
- Beginning the plan for stewardship will help regulators, and others interested in the process understand what the endpoint of the remediation phase will be and what LTES can be expected to achieve.
- The issues identified in planning will also help determine research and development direction for future environmental technologies.
- SNL/NM's location on a federal facility, **Kirtland Federal Complex (KFC)**, and its activities on U.S. Forest Service (USFS) lands means additional stakeholders and issues must be considered. While these federal agency stakeholders are already meeting and discussing mutual issues, the actual resolution of the LTES issues will require an iterative process and may involve several drafts of this plan over time.
- Planning for environmental stewardship represents SNL/NM's and the **U.S. Department of Energy's (DOE's)** commitment to protect the public health and the environment.

Currently, few regulatory requirements or departmental orders bear directly on the concept of environmental stewardship. The present requirements arise from a variety of regulatory sources[2] and include provisions requiring: long-term monitoring (LTM); **engineered controls** such as containment systems; protection of historic sites and archaeological resources; protection of threatened and endangered species; consideration of environmental justice in the community; property management controls; and reporting. Some DOE guidance has been issued and more is under development. Long-term care and post-closure plans under the **Resource Conservation and Recovery Act (RCRA)** offer some direction for LTES. Additional guidance is being explored by SNL/NM, the DOE, and involved regulators. While further legislation and regulation are anticipated, it is not possible to know what form it may take. Thus, in this initial draft LTES plan, regulatory requirements can be addressed only at a high level.

The balance of this introduction discusses the (1) purpose of LTES (objectives), (2) intent of stewardship (scope and intent), and (3) assumptions made for the development of the first draft LTES plan.

1.1 LTES Objectives (Purpose)

This LTES plan has the following objectives:

- Recognize SNL/NM and DOE responsibilities to protect human health and the environment from residual hazards that remain on SNL/NM sites, or **Solid Waste Management Units (SWMUs)**.

- Outline a process to move a site from closure into the LTES program, tracking the site even if ownership may change, and removing it from stewardship only when appropriate criteria are met.

- Keep relevant records and information in a way that future generations (**stewards** and **stakeholders**) can access them for help in providing effective stewardship.

- Identify appropriate **institutional controls (ICs)** and **physical controls.** Provide both a system and a commitment to maintain these as long as required, regardless of changes in ownership.

- Identify the roles and responsibilities of all those involved in LTES and develop forums to foster public confidence and cooperation.

- Provide an emergency response and contingency plan in the event that a residual hazard becomes a threat to the community.

- Outline financial and legal requirements for the plan so that all stakeholders can know what is needed in these areas to make environmental stewardship viable.

- Suggest ways to build and maintain partnerships with local, state, and Tribal governments likely to have some role in LTES activities. In the case of SNL/NM, this also includes other federal agencies associated with the KFC. The complex is shown in Figure 1.1-1 and discussed in more detail later in this document.

All these objectives should be achieved in a way that is financially feasible, but also flexible. Changes to the LTES plan—part and parcel of its flexibility—are discussed in more detail in Chapter 5.0 of this document.

1.2 LTES Scope and Intent

This document reviews existing programs that will become a part of SNL/NM's LTES network of programs. It also outlines new programs that will fit into a complete SNL/NM stewardship

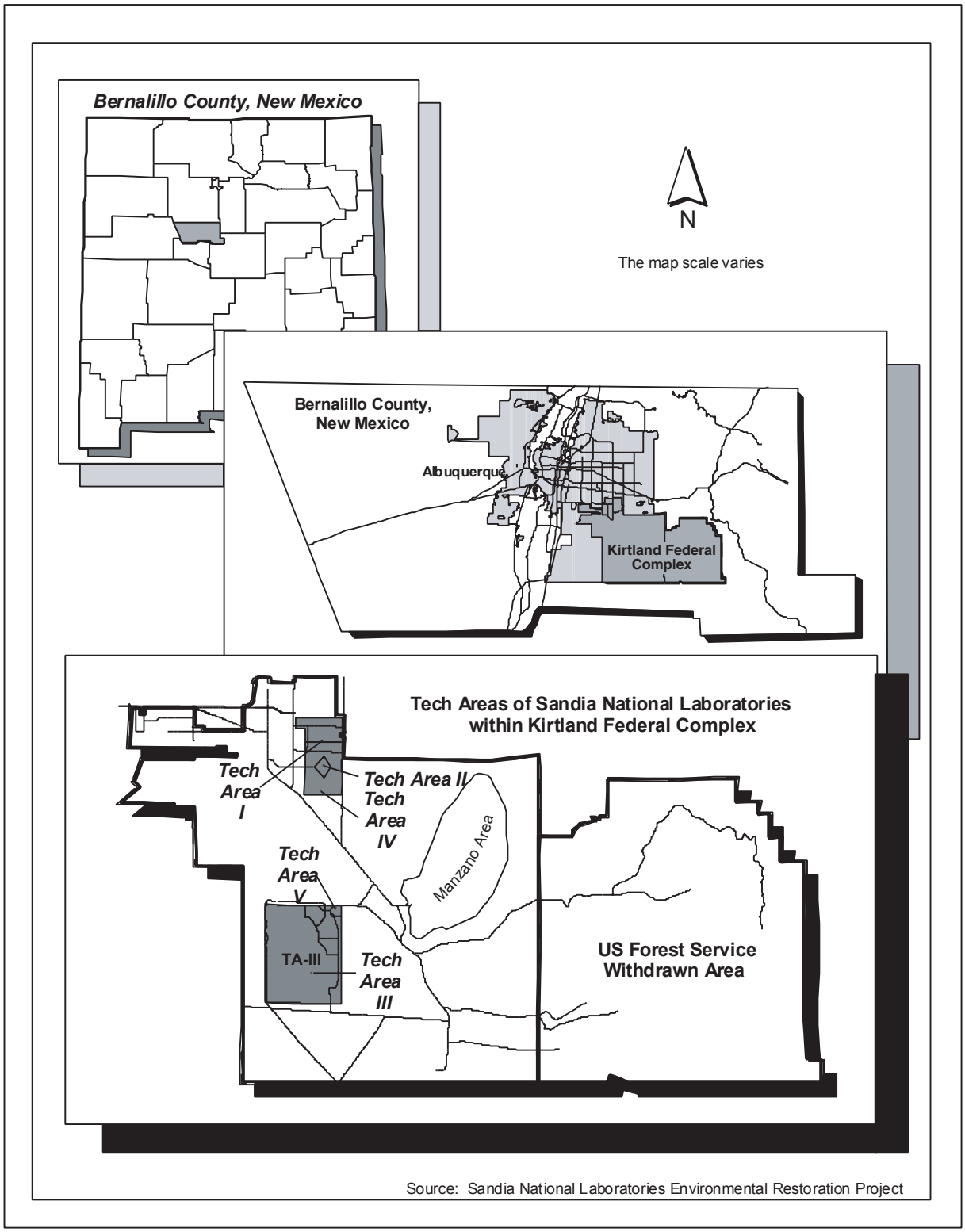

Figure 1.1-1

The Location of Kirtland Federal Complex and Sandia National Laboratories/New Mexico

(As shown here, Kirtland Federal Complex, host to Sandia National Laboratories in New Mexico, spans most of the southeastern boundary of the City of Albuquerque.)

program. The document is not intended to be fully detailed for immediate implementation, but rather to serve as a coordinating and planning document for an iterative process of review and improvement leading, in four to six years, to a fully developed plan. To meet this coordinating role, other important documents are cited in the text of this plan or attached as appendices.

Spaced among the plan's chapters are boxes headed with the word "**Issue**" to denote discussions of importance to the text, but for which decisions are beyond the scope of the plan's authors. These boxes emphasize the importance of further iterations of this plan as these issues are addressed.

Chapter 2.0 addresses SNL/NM's plans for both ICs and physical controls that will supplement them. The chapter explains an approach of grouping ER sites by category and applying appropriate ICs and physical controls to these groups.

Chapter 3.0 addresses monitoring plans for LTES. The chapter explains SNL/NM's monitoring approach, discusses some of the environmental monitoring in place and uses a key SNL/NM ER site, the **Mixed Waste Landfill (MWL)**, as an example of how LTES monitoring will be carried out.

Chapter 4.0 provides an overview of SNL/NM's plans for information management associated with LTES and Chapter 5.0 addresses the management of LTES at SNL/NM and the public participation aspects of this plan. Chapter 5.0 includes a description of organizations involved in LTES planning and implementation, schedules, reports and other items "deliverable" to various stewards and stakeholders, and budget issues. Because the plan is designed to be a "living document," a process for changes to the plan is also addressed in Chapter 5.0.

Chapter 6.0 presents a plan to move LTES forward from where it is today.

Chapter 7.0 presents a chronology of public involvement in the LTES process.

This plan is intended to address the stewardship only of SNL/NM's SWMUs. The plan contemplates the possible sharing of information and tools with Kirtland Air Force Base's (KAFB's) **Installation Restoration Project**, but it does not address environmental sites that are the responsibility of the U.S. Air Force (USAF).

1.3 LTES Assumptions

1. U.S. Congress will provide adequate funding to implement the LTES requirements.

2. KAFB will not be impacted by the Base Re-Alignment Commission (BRAC) process and will continue to function as a military installation with controlled access and land use. Land use and access restrictions will remain unchanged.

3. The DOE will continue to be the oversight federal agency for SNL/NM as it is for other laboratories and facilities throughout the nuclear weapons complex.

4. SNL/NM will continue to play a role in the national interest and continue to operate as a multi-program research and development institution.

1.4 LTES Setting

SNL/NM is a DOE national security laboratory operated for the DOE by the Sandia Corporation, a Lockheed Martin company. Sandia designs all nonnuclear components for the nation's nuclear weapons, performs a wide variety of energy research and development projects, and works on assignments that respond to national security threats — both military and economic.

SNL/NM is a large laboratory complex and headquartered in Albuquerque (more than 6,600 employees). Because SNL/NM facilities are located on KFC (Figure 1.1-1), a number of relevant federal agencies, including the Agriculture and Defense departments, join nearby tribes, government agencies, regulators, and other citizen groups interested in environmental stewardship as possible stakeholders.

The DOE is the cabinet-level department charged with development and management of the U.S. nuclear weapons stockpile, as well as other national security, energy, science and environmental quality responsibilities. As such, the DOE provides federal oversight and funding for SNL/NM. The local DOE Kirtland Area Office (KAO) provides management and technical oversight of daily SNL/NM activities.

SNL/NM ER is several years from the closure phase, with the schedule depending on budget levels. Of more than 200 sites identified for study and possible cleanup at SNL/NM, 137 have now been approved for closure.

1.5 Site Background

During World War II and the subsequent Cold War, the U.S. government developed and operated a large network of industrial and research facilities to design, develop, produce, and test nuclear weapons and for other scientific and engineering research. These processes left a legacy of radioactive and chemical wastes, environmental contamination, and hazardous facilities and materials across the nation.

The story of SNL/NM is woven into the fabric of this national effort. SNL/NM became an entity in 1946, as a part of the **Manhattan Project**—the then-secret project to construct the first U.S. atomic bomb. The principal mission of SNL/NM has been, and continues to be, providing technical expertise in the design, development, and testing of weapons for the nation's nuclear arsenal. Many of the processes used in carrying out this mission involve the use of hazardous and radioactive materials.

Since 1989, the DOE's **Environmental Management (EM)** program has made significant progress in addressing the nation's nuclear complex environmental legacy[3]. Formed in 1992 as a part of that initiative, the SNL/NM ER Project was charged with the assessment and, if necessary, the remediation of inactive waste sites. This assessment actually began formally in 1984 for SNL/NM, when the DOE Albuquerque Operations Office (DOE/AL) participated in the **Comprehensive Environmental Assessment and Response Program (CEARP)** to identify, assess, and remediate potentially hazardous waste sites.

The CEARP study identified 117 sites at SNL/NM and was submitted to the U.S. Environmental Protection Agency (EPA) in September 1987. A similar investigation was conducted by the EPA Region VI office in April 1987. These programs ultimately defined a working inventory of 203 sites, or SWMUs, to be investigated during the course of the ER program. At this writing, 66 of these sites remain on SNL/NM's permit in the remediation process. Another 137 have been approved for closure status.

A detailed list of all SNL/NM sites requiring further investigation is included in Appendix A. A summary of the sites and their status in the long-term stewardship program is also included.

The current investigations at SNL/NM under the ER Project are intended to determine the nature and extent of hazardous and radioactive contamination and to remediate any sites where such materials pose a threat to human health or the environment.

SNL/NM participated in a multi-agency-citizen planning process in the early 1990s to establish future land-use recommendations for ER sites on KFC. This enabled ER decision making to incorporate environmental stewardship planning early in the clean-up process. In the intervening years, the ER project has used a risk assessment process based on these future use recommendations to help guide clean-up decisions.

Complementary to the clean-up effort, SNL/NM has put procedures and processes into place to further protect the environment. Testing with hazardous chemicals and radioactive materials, for example, is carefully controlled to prevent releases to the environment. Chemicals used in the many laboratories and manufacturing settings at SNL/NM are tracked in a "cradle-to-grave" approach that assures the protection of workers, the public, and the environment. Pollution prevention principles are employed in building new facilities, planning tests, and managing operations. All environmental media are carefully monitored. Inadvertent releases are controlled and cleaned up.

In New Mexico, key facilities involved in this waste management effort include SNL/NM's Hazardous Waste Management Facility, Solid Waste Transfer Station (including recycling facilities), and Radioactive and Mixed Waste Management Facility.

1.6 LTES Definitions

Because it is difficult to proceed in a plan of this sort without use of terms specific to the ER effort, this section defines and discusses some important terms. To help the reader with the myriad of terms in a plan such as this, a full glossary is also appended to the plan.

Cleanup – The process of addressing contamination problems in accordance with environmental and health requirements. Often used by the public synonymously with "remediation," "cleanup" as used here does not imply that all hazards will be removed from the site. Remediation also involves passive measures, such as landfill covers, while cleanup has the more active definition of removing contamination from a site.

Closure – A condition in which the cleanup of a site is considered to be complete, excluding any long-term surveillance and monitoring requirements. Releases to the environment have been cleaned up to standards set by the regulators, are contained, or are the object of long-term treatment or monitoring programs. Or, a condition where investigation is complete and no

contamination which is a risk to human health or the environment has been found. Closure designations can be revoked by the regulator if new information becomes available or a change in site status occurs.

Environmental Restoration (ER) – This function, again used in the public domain as a synonym for "cleanup," includes a range of activities such as stabilizing contaminated sites, treating groundwater, and excavating buried wastes.

Future Land Use Categories – Before regulators can approve a site for closure, a future land use must be assigned to it. Given a likely future use, the regulator then can evaluate the level of contamination and associated risk remaining at a site and determine if closure and movement to LTES is appropriate. The most often-used land-use categories for SNL/NM are:

> **Residential** – Suited for permanent residential use;
>
> **Industrial** – Suited for an active industrial facility; and
>
> **Recreational** – unfenced areas where daytime uses like hiking, biking, sports, or hunting and some overnight camping are allowed.

Groundwater Units – These are areas of concern for contamination or potential contamination of aquifers. They are not directly tied to surface ER sites. SNL/NM has five such units.

Institutional Controls (ICs) – Nonengineering measures, usually but not always involving legal means, intended to prevent or reduce human exposure to hazardous substances at sites. Examples are land use designations, deed restrictions, building permits, and water use advisories. They are distinct from physical controls, such as signs, fences, landfill covers, or monitoring systems.

Long-term Environmental Stewardship (LTES) – The activities necessary to ensure protection of human health and the environment following completion of cleanup, disposal, or stabilization at a site or portion of an ER site.

LTES Categories – SNL/NM's 203 sites fall into one of the following four categories suggested by stakeholders for stewardship purposes:

> **Engineered Units/Landfills** – These are units with engineered controls, such as landfill covers, lined disposal cells, and monitoring systems. Three sites at SNL/NM are in this LTES category—the **Chemical Waste Landfill (CWL)**, the **Corrective Action Management Unit (CAMU)**, and the **Mixed Waste Landfill (MWL)**.
>
> **Signed and Fenced Units** – These sites have mainly physical hazards, such as mineshafts or pits, although a few in this group contain sufficient levels of residual contamination to warrant LTM. There are 14 sites in this category.
>
> **Signed Units** – Most of the 65 sites in this group have been granted "closure" status by the regulator. Some have residual contamination above background levels, but meet risk levels for industrial or recreational future land use designations. Because some risk persists, some level of **environmental monitoring** is planned at these sites.

No Site Control Required Units – Levels of contamination remaining at these sites, if any, are so low as to pass even residential land-use criteria. However, current land-use scenarios for these 135 sites are either industrial or recreational.

New Mexico Environment Department (NMED) – The agency with regulatory authority for SWMUs at SNL/NM.

Solid Waste Management Unit (SWMU) – This legal term was developed under federal legislation to ensure remediation activities at environmental sites. Often, "SWMU" is a synonym for an ER site; however, it also can be used to designate a number of sites with some common theme. There are two types of SWMUs relevant to the SNL/NM cleanup:

Conditional Release Sites – If a SWMU has residual contamination above regulatory levels of concern, it may be appropriate for some land uses, but not for all. Just as there is a broad range of residual contamination possibilities, there is a range of possible uses. Approval for these uses would be determined using risk-based criteria with concurrence of the regulators.

Unlimited Release Sites – If no contamination was discovered during the investigation process or if site clean-up efforts reduced the level of residual contamination to below levels of regulatory concern, sites may be released unconditionally. Sites approved for such a release would still require administrative stewardship actions. Information on the site investigation, cleanup, and final status must be maintained in a way that connects it with the site for the benefit of future users.

Stakeholder – Those citizen groups and organizations expected to have a role in LTES.

Steward – The agency responsible for LTES activities. At SNL/NM sites the steward is the DOE and any successor organization(s). This role is sometimes described as the "principal" steward. The "implementation" steward, or the entity responsible for actual stewardship operations, is SNL/NM or any successor organization(s).

1.7 LTES Community Involvement

LTES is a complex process that cannot be successfully performed in isolation. Issues of natural and cultural resources, economics, and environmental justice are all woven into stewardship. SNL/NM and DOE first began efforts at involving interested community groups in ER activities in 1990. Beginning with quarterly public meetings to engage the public, DOE established an SNL/NM **Citizen Advisory Board (CAB)** early in 1995.

In fiscal year (FY) 2000, CAB activities ended. A transitional group, comprised of former CAB members and other citizens, helped to establish three LTES task groups in May of 2000. The three task groups tackled these key aspects of LTES, each providing a final report on its activities:

- **Management** – Managing the operation of stewardship activities from the viewpoint of both stewards and stakeholders. Among the topics this group addressed were: how an LTES program should be administered, how funding should be determined, and how community outreach should be continued.

- **Environmental Monitoring** – Determining physical controls for stewardship sites and both site and regional environmental monitoring programs to help evaluate the safety of the community and the environment. The task group outlined a **decision logic** and **uncertainty matrix** approach to deciding what controls and monitoring are needed.

- **Institutional Controls (ICs) and Information Management** – This group studied nonengineering measures, usually legal in nature, to reduce or eliminate human exposure to residual contamination and the needs for a system of information to serve LTES. The task group outlined important considerations for implementation of both information management and IC systems.

These reports are provided as Appendices B, C, and D to this report. Information about the contributors is attached as Appendix E. Among task group members were citizens of neighborhoods situated near SNL/NM facilities and the **Isleta Pueblo**, local and state government representatives (including regulators), interested professionals, and several former CAB members representing a variety of constituencies. Also participating in the task groups were DOE and SNL/NM representatives from a number of organizations likely to be affected by LTES.

Following numerous meetings, the task groups produced three reports reflecting the concerns, values, and recommendations. In addition to the valuable subject matter recommendations for the SNL/NM LTES program, the task groups converged significantly on the view that public participation must continue to be a part of a healthy LTES program. Among the recommendations were the following:

- One or more community members should be allowed to fully participate in all decisions and choices, preferably as part of an LTES program's executive group.

- Community members should be invited to participate in all program elements, including the closure comment process, major site reviews, and groundwater monitoring.

The DOE is committed to public involvement in the LTES program. The DOE SNL/NM proposal for citizen involvement in LTES is discussed in Chapter 5.0.

2.0 INSTITUTIONAL AND PHYSICAL CONTROLS

As the SNL/NM ER Project approaches the transition from active remediation to LTES, a range of IC issues must be addressed. An IC is a legal or administrative mechanism to limit access to or use of property or to warn of a hazard. An IC can be imposed by the property owner, such as a use restriction contained in a deed, or by a government, such as a zoning restriction.

ICs are used to prevent unacceptable exposure to residual contaminants that could pose risks to human health and the environment. They provide assurances that final land use will be compatible with long-term stewardship goals by limiting development on or restricting access to areas of residual contamination. ICs are typically used in conjunction with engineered measures (such as waste treatment or containment) as part of a final remedy[4]. Some examples of ICs include easements, covenants, well drilling prohibitions, zoning restrictions, and special building permit requirements.

This plan proposes an initial implementation strategy for ICs at SNL/NM. Because it precedes much of the external (particularly regulatory) evolution of thought and statute in the stewardship area, the plan should be seen as a first step in a complex process that is likely to require many additional steps prior to reach successful completion.

Effective ICs must be low-cost, highly effective, easily implemented, and adaptable over relatively long periods of time. In fact, they often must outlive the institutions that create them. Thus, they need to be easily transferred to subsequent authorities having control of the land.

SNL/NM is located within the physical boundaries of the KFC which includes land withdrawn from public use (Figure 2.0-1). The KFC, which encompasses approximately 52,233 acres in southeast Albuquerque, is the term used to define the physical and geographical area within which the facilities and infrastructure of the DOE and USAF have developed. All the lands on the KFC are federally owned and controlled.

Because of federal land ownership, the only institutional controls currently possible are **proprietary or governmental controls**. Governmental controls are restrictions that are within the traditional police powers of federal, state and local governments to impose and enforce. Examples of governmental controls include **zoning restrictions**, **siting restrictions**, and **groundwater restrictions**.

Proprietary controls such as easements are tools based upon private property law used to restrict or affect the use of property. They are a private contractual mechanism contained in the deed or other document transferring the property. Table 2.0-1 provides an overview of the range of ICs.

There are significant differences in the way ICs are applied. Some proprietary or governmental controls cannot be applied on active federal facilities. However, for properties being transferred as part of a base closure, the **Department of Defense (DOD**) does have the authority to restrict property by retaining a property interest, such as an easement. For active bases, ICs are commonly addressed through remedy selection documents, base master plans, and separate Memoranda of Understanding (MOU)[5].

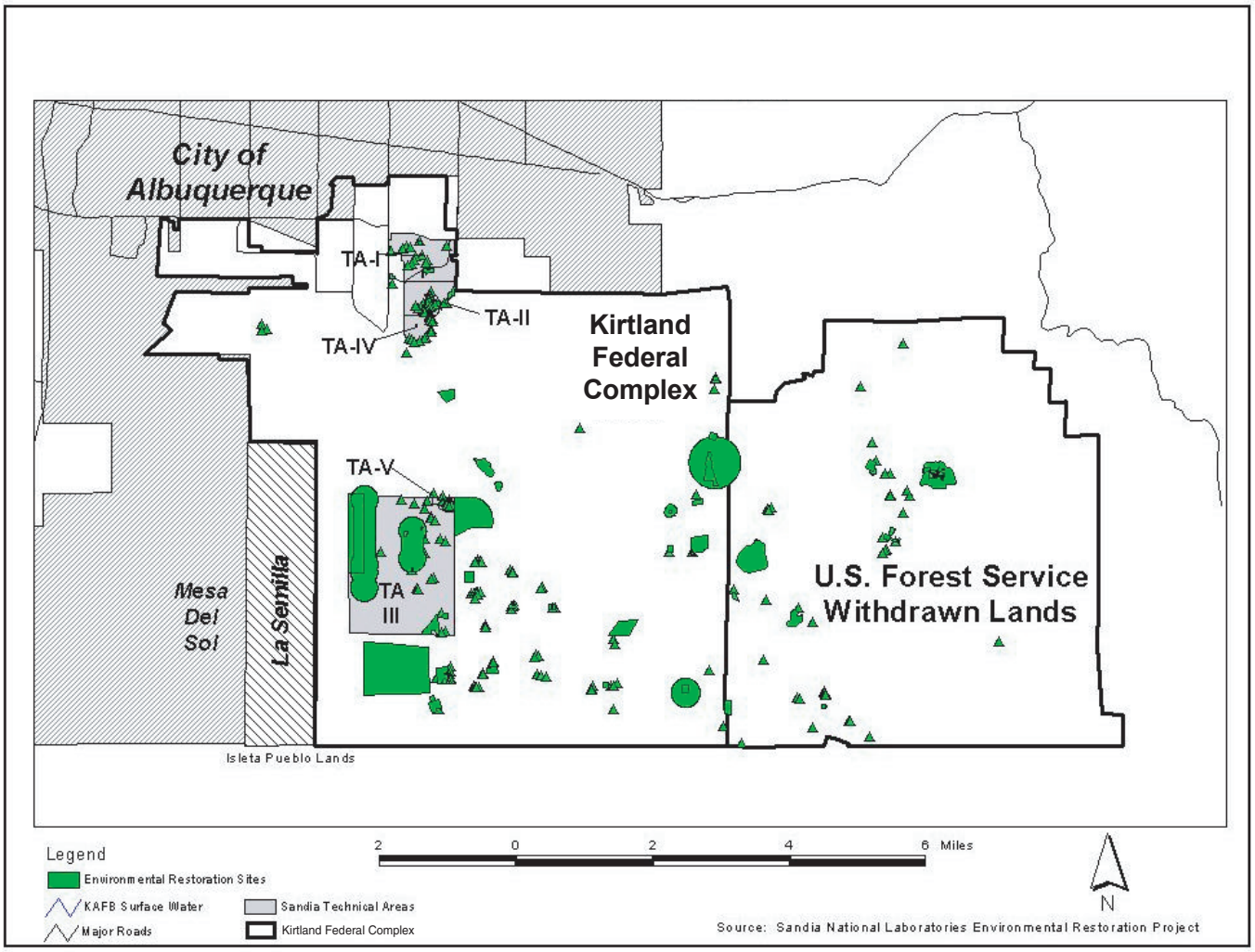

Figure 2.0-1

Sandia National Laboratories/New Mexico, Environmental Restoration Sites Location Map

(This map illustrates the Sandia National Laboratories/New Mexico Environmental Restoration sites across Kirtland Federal Complex, showing portions of the base withdrawn from United States Forest Service lands.)

Table 2.0-1
Classification of Institutional Controls

Classification	Description
Government Controls	Governmental controls are restrictions that are within the traditional police powers of state and local government to impose and enforce. Permit programs and planning and zoning limits on land use are examples of governmental controls. Some types of governmental controls: Zoning Restrictions– Use restrictions imposed through the local zoning or land use planning authority. Such restrictions can limit access and prohibit disturbance of the remedy. Zoning authority does not exist in every jurisdiction. Siting Restrictions – Control land use in areas subject to natural hazards, such as earthquakes, fires, or floods. Such restrictions are created through statutory authority to require that states implement and enforce certain land-use controls, as well as through local ordinances. Groundwater Restrictions – Specific classification systems used to protect the quality of, or use of, groundwater. These systems operate through a New Mexico well permitting system. Under them, criteria may be established that must be met before a use permit or construction is allowed.
Proprietary Controls	Proprietary controls are tools based upon private property law used to restrict or affect the use of property. They are a private contractual mechanism contained in the deed or other document transferring the property. Proprietary controls involve the placement of restrictions on land using easements, covenants, and reversionary interests. They are “nonpossessory” interests. (Nonpossessory interests give their holders the right to use or restrict the use of land but not to possess it.)
Active Controls	Active controls require clear institutional and human responsibilities and the active performance of measures to achieve these responsibilities. Examples are controlling access to a disposal site by means such as guards; performing maintenance operations or remedial actions at a site; controlling or cleaning up releases from a site; or monitoring parameters related to disposal system performance.
Passive Controls	Passive controls are defined by their dependence on the design of controls and structures. Examples are permanent markers placed at a disposal site; public records and archives; government ownership and regulations regarding land or resource use; and other methods of preserving knowledge about the location, design, and contents of a disposal system.
Structural Controls	Structural controls include **physical barriers** (such as gates, fences, and natural barriers) to keep trespassers away from a site, signs to warn people of dangers, and engineered barriers restricting or containing actual or potential contaminant migration.
Nonstructural Controls	Nonstructural controls are all other limitations on the use of land that do not require physical means of exposure prevention.

SNL/NM has not completed the remediation phase of its ER work, hence, many of the decisions concerning specific ICs for its sites have not been determined or negotiated with the regulators and will be subject to change over the next few years. In the future, both SNL/NM and KAFB IC programs may be evaluated together. This will be dependent on state regulators, input from various federal agencies, and the public.

2.1 Land Status and Institutional Controls for SNL/NM

Between 1995 and 1997, the **Future Use Logistics and Support Working Group**, consisting of the DOE, the USAF, and the USFS, met to work out issues concerning the future uses of the KFC. As a result of this working group, five workbooks on future use management of the KFC were written. These documents are considered the foundation work for land-use discussions that will need to take place for the ICs in long-term stewardship[6].

SNL/NM facilities and infrastructure are located within the KFC, in southeast Albuquerque. SNL/NM has five distinct areas, known as technical areas (TAs), which are owned and controlled by DOE. Additional SNL/NM facilities and infrastructure are located on land either permitted to DOE from other Federal agencies or leased from other state and local governments[7] The DOE currently owns approximately 2,937 acres within the KFC. In addition to these DOE-owned lands, approximately 14,920 acres are utilized by SNL/NM for DOE work through land use permits or leases from KFC, the State of New Mexico, the Pueblo of Isleta, and through land withdrawn from the Cibola National Forest[7].

There are a wide variety of land-use agreements affecting ER Project sites. Table 2.1-1 summarizes the number of SWMUs by agreement status. The majority of the SWMUs are on some type of land that has been permitted for use by the DOE SNL/NM. However, 28 sites are on land that has not been permitted for use by DOE SNL/NM. These represent 13 percent of the total number of SWMUs going into stewardship.

The General Services Administration in consultation with the Department of Justice would likely play an important role in the placement of ICs in deeds, regardless of the particular agency in control. In fact, none of the agencies involved—DOE, DOD, or the USFS—actually own the land. The title is in the name of the U.S. government[8].

Coordination between KAFB and DOE is another key element. MOU and SNL/NM internal controls will need to be developed. In the event that KAFB faces closure through the DOD BRAC process, some LTES actions would need reprioritization, particularly if a BRAC decision leads to release of government property to other agencies or to the public[8].

Issue 1: Need for Continued Interagency Consultation

SNL/NM is located within the physical boundaries of the KFC which includes land withdrawn from public use. Many of the ICs will need to be established through interagency consultation. In January 2001, an initial “kick off” meeting of federal stakeholders took place, with the goal of working through many of these issues concerning ICs. Present participants are DOE, DOD, USFS, and Bureau of Land Management (BLM). At present, this group plans to meet quarterly.

Table 2.1-1
Summary of SWMUs by Status

Type of Land Ownership	Number of SWMUs
DOE-Owned land	71
No Permits	29
USAF withdrawn from USFS permitted to DOE	31
USAF permitted to DOE	45
DOE withdrawn from USFS	2
Sites transferred to KFC	2
USTs with no permit status known	14
Joint Operating Agreement between DOE, SNL/NM and Phillips Laboratory	9
Total number of sites	203

DOE = U.S. Department of Energy.
KFC = Kirtland Federal Complex.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
USAF = U.S. Air Force.
USFS = U.S. Forest Service.
UST = Underground storage tank.

2.2 Physical Controls

Physical controls, such as fences that restrict access to sites, are often termed ICs. However, because fences are physical barriers instead of administrative or legal measures, the EPA does not consider them ICs[4]. For this document, physical barriers are considered to be a supplemental part of any ICs chosen.

LTES requirements may include some or all of the following physical controls:

- **Engineered Controls** – Systems such as landfill covers and lined disposal cells will be monitored to assure containment of any residual contamination. Operation of these systems will be spelled out in ER Project, post-closure documentation.

- **Signed and Fenced Units** – Physical controls must be properly maintained and will be inspected on a 6-month basis. Post closure care plans will define appropriate maintenance requirements for both signs and fences.

- **Security Controls** – These include on-site patrols and security gates. While these controls will be maintained by SNL/NM's security organization, a close information tie will link security to data on land ownership and environmental knowledge about a given site.

Various levels of administrative and physical controls, dependent on the hazards present, will be instituted to ensure that future activities at the site are restricted in a way commensurate with the designated land use. Among the controls are:

- **Administrative Controls** – Deed restrictions, land-use restrictions, and other conveyances are enforced;

- **Physical Controls** – The integrity of physical structures (such as landfill covers, disposal cells, berms, operating remedial systems, gates, and fences); and

- **Contaminant Controls** – Detect and locate any constituent release and migration.

The ER Project is in the process of evaluating, assessing, and remediating 203 SWMUs at the SNL/NM site. As of this writing, 66 sites remained on the **Hazardous and Solid Waste Amendments** (**HSWA**) permit in the remediation process. SNL/NM has proposed **No Further Action (NFA)** status for 137 of the 203 sites to the state and federal regulatory authorities. For approximately 40 percent of the sites, some type of IC and/or physical controls will be necessary as part of the NFA approval process.

Some SNL/NM sites will need physical controls, such as signs, fencing, and capping in addition to groundwater monitoring and containment monitoring. For the groundwater units, ICs that would restrict groundwater use will be part of a long-term groundwater monitoring plan. For all sites, some type of information system will be needed to allow future users to understand the number of SWMUs, their dispositions, and any restrictions placed for future use. This becomes critical for SNL/NM planners, emergency management personnel, and future users of the test areas and is discussed in more detail in Chapter 5.0.

In response to the National Defense Authorization Act of 2000, DOE was required to report to Congress on the number of DOE sites that would enter into long-term stewardship. In December 2000, SNL/NM answered an information call from DOE to determine which SWMUs would be entering LTES[9]. As an outcome of this data call, SNL/NM divided the sites into four categories, based upon the types of ICs and physical controls that would be needed at each site. These categories are:

- Engineered units
- Groundwater protection units
- Signed and fenced units
- Signed units

Figure 2.2-1 is a schematic diagram of LTES activities by category. Each of these categories will be discussed later in this chapter. Appendix A contains a summary table of information concerning all sites. The “IC category” listings are based upon current knowledge of what the potential ICs are expected to be. This may change as the ICs for individual sites are negotiated with the regulators.

2.3 Engineered Units

This category includes those SWMUs that need some type of engineering as part of closing the site, such as construction of caps and containment cells. There are three engineered units at SNL/NM—the CWL, the MWL, and the CAMU. Figure 2.3-1 shows the location of these three engineered units. All three are located in SNL/NM's TA-III on DOE-owned land.

Table 2.3-1 summarizes the proposed ICs for the engineered units.

SNL/NM's TA-III is approximately five miles south of the Wyoming Gate to KFC, and is a fenced, property protection area requiring special badges for entrance. All three sites will be signed and

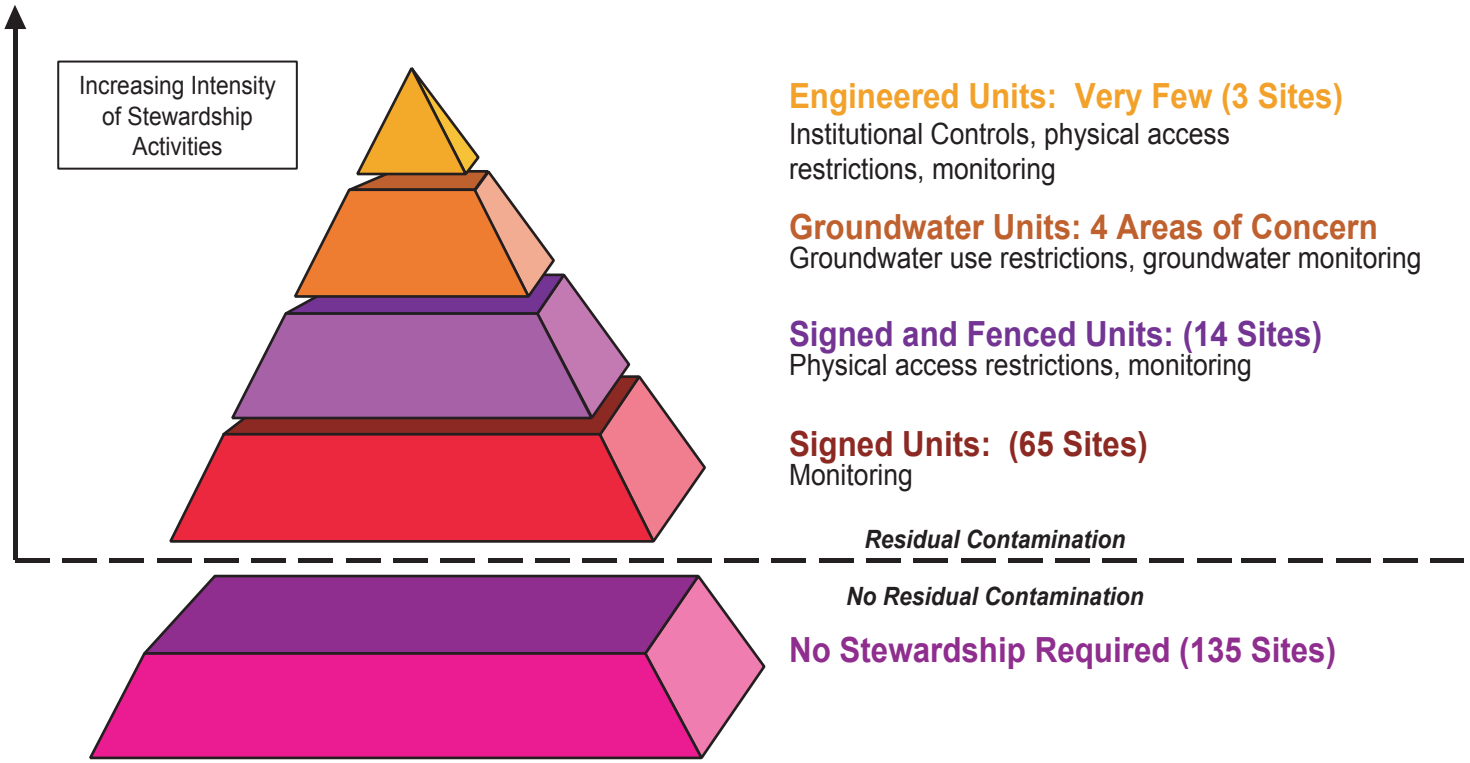

Figure 2.2-1
Stewardship Activities will Vary in Intensity

(Shows that engineered units [top of pyramid] will receive much more intensive LTES activities than signed and fenced or signed units.)

Table 2.3-1
Summary of Institutional and Physical Controls for the Engineered Units

Area	Type of Control	Purpose	Responsible Party
SWMU 76– Mixed Waste Landfill	Proprietary Control	Restrict land use to maintain cell integrity	DOE
	Fencing	To restrict access	DOE, SNL/NM
	Signing	To notify users/workers of the existing hazards	DOE, SNL/NM
	Informational	To track the monitoring information and site status	DOE, SNL/NM
SWMU 74– Chemical Waste Landfill	Proprietary Control	Restrict land use to maintain cell integrity	DOE
	Fencing	To restrict access	DOE, SNL/NM
	Signing	To notify users/workers of the existing hazards	DOE, SNL/NM
	Informational	To track the monitoring information and site status	DOE, SNL/NM
SWMU 107– Corrective Waste Management Unit	Proprietary Control	Restrict land use to maintain cell integrity	DOE
	Fencing	To restrict access	DOE, SNL/NM
	Signing	To notify users/workers of the existing hazards	DOE, SNL/NM
	Informational	To track the monitoring information and site status	DOE, SNL/NM

DOE = U.S. Department of Energy.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

fenced and will be tracked via the LTES information management system (IMS). (This system is discussed in Chapter 4.0.) All three sites will have an extensive groundwater monitoring network established to monitor the groundwater for contamination.

It is anticipated, that as part of any post-closure document, there will be proposed five-year reviews that will include an evaluation of the effectiveness of these physical and ICs. These reviews would be part of any post-closure permits that might be developed. Since SNL/NM is still in active remediation of the MWL and CWL and development of the CAMU, no regulatory environment for LTES has been developed as of 2001.

2.4 Groundwater Units

The land overlying four areas of groundwater concern is federally controlled by the DOE, DOD, or the U.S. Department of Agriculture USFS (Figure 2.4-1). Future users of the land are anticipated to be industrial on-site workers and occasional public recreational visitors.

The goal of SNL/NM's LTM strategy for groundwater is to protect the regional water supply from significant long-term impacts. Water-supply protection can be accomplished by designing a groundwater monitoring program that will serve as an early warning system to indicate whether water-supply wells could be affected by groundwater plume migration associated with past (historic) disposal activities on KFC. The text of SNL/NM's LTM plan is included as Appendix H.

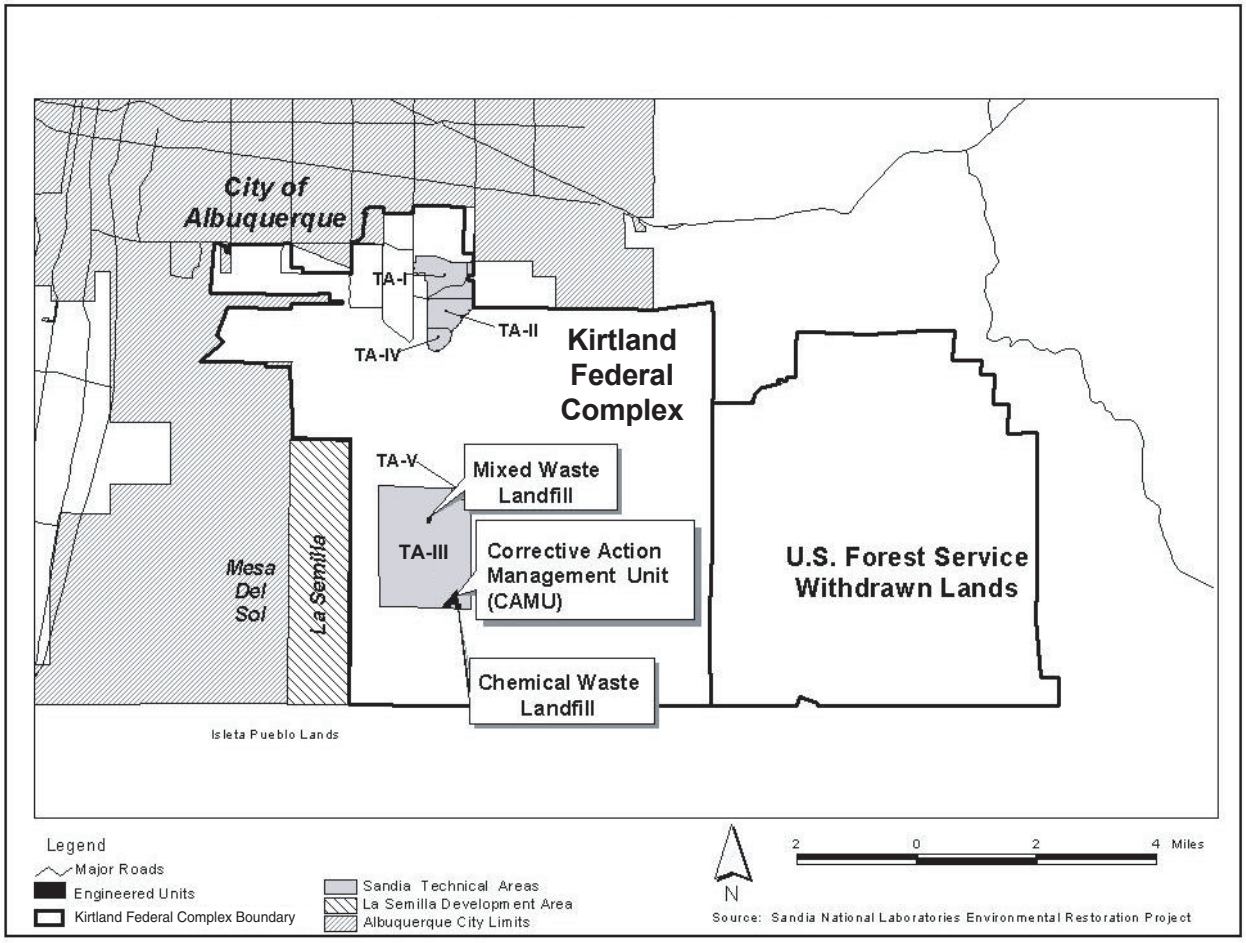

Figure 2.3-1
Sandia National Laboratories/New Mexico, Engineered Units Location Map

(Location of the engineered units. All three are located in Sandia National Laboratories/New Mexico Technical Area-III.)

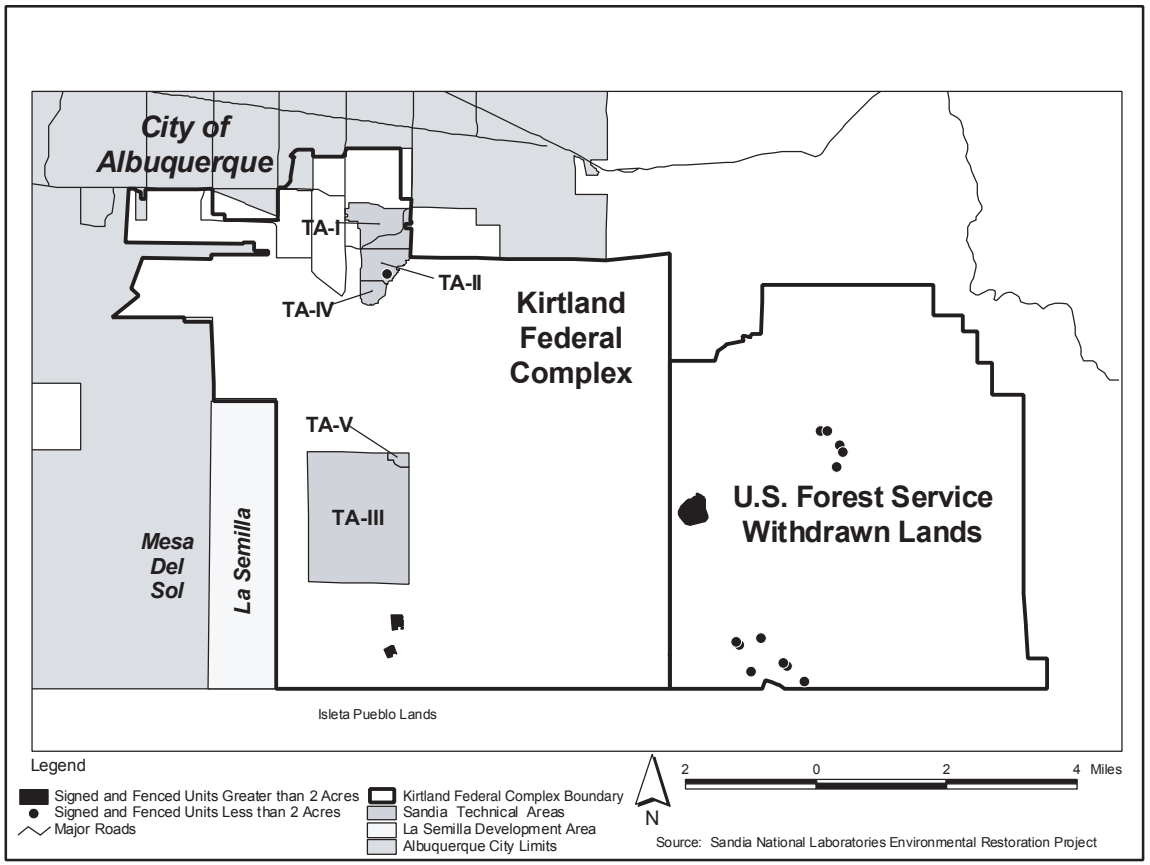

Figure 2.4-1

Sandia National Laboratories/New Mexico, Signed and Fenced Units Location Map

(Illustrates the location of Sandia National Laboratories/New Mexico's signed and fenced units.)

The DOE will seek agreements with the DOD and the USFS to allow long-term access to the sites for groundwater monitoring, well maintenance, and repair activities.

Issue 2: Need for DOD/DOE Access Agreements

DOE currently seeks 5-year real estate agreements with KFC through an established process. LTES access to the sites for groundwater monitoring, monitoring well maintenance, and repair activities may involve a modified land use permit or withdrawal documentation that includes access language.

2.5 Signed and Fenced Units

The signed and fenced units include those where there is a potential for future erosion, some physical hazard, or a mine shaft. Figure 2.5-1 shows the location of these units. A summary table of the physical and ICs for the signed and fenced units is located in Appendix A.

All of the signed and fenced units will be tracked via the LTES IMS (see Chapter 4.0.).

It is anticipated, that as part of any post-closure document that there will be proposed five-year reviews that will include an evaluation of the effectiveness of these physical and ICs. These reviews would be part of any post-closure permits that might be developed. Since SNL/NM is still in active remediation of many of these sites, no regulatory environment for LTES has been developed as of 2001.

2.6 Signed Units

The primary IC for the signed units is that of government ownership. Figure 2.6-1 shows the location of these 65 units, located throughout the KFC. These sites have the status of signed units because:

- They were designated for LTES on the basis of a risk-based NFA
- Residual contamination is greater than background
- Incremental human health and ecological risks are greater than the residential land-use scenario, but less than the industrial land-use scenario.

A summary table of the physical and ICs for the signed units is located in Appendix A. All of these sites will be signed and tracked via the LTES IMS, described in Chapter 4.0.

It is anticipated that, as part of any post-closure document, that there will be proposed five-year reviews that will include an evaluation of the effectiveness of these physical and ICs. These reviews would be part of any post-closure permits that might be developed. Since SNL/NM is still in active remediation of many of these sites, no regulatory environment for LTES has been developed as of 2001.

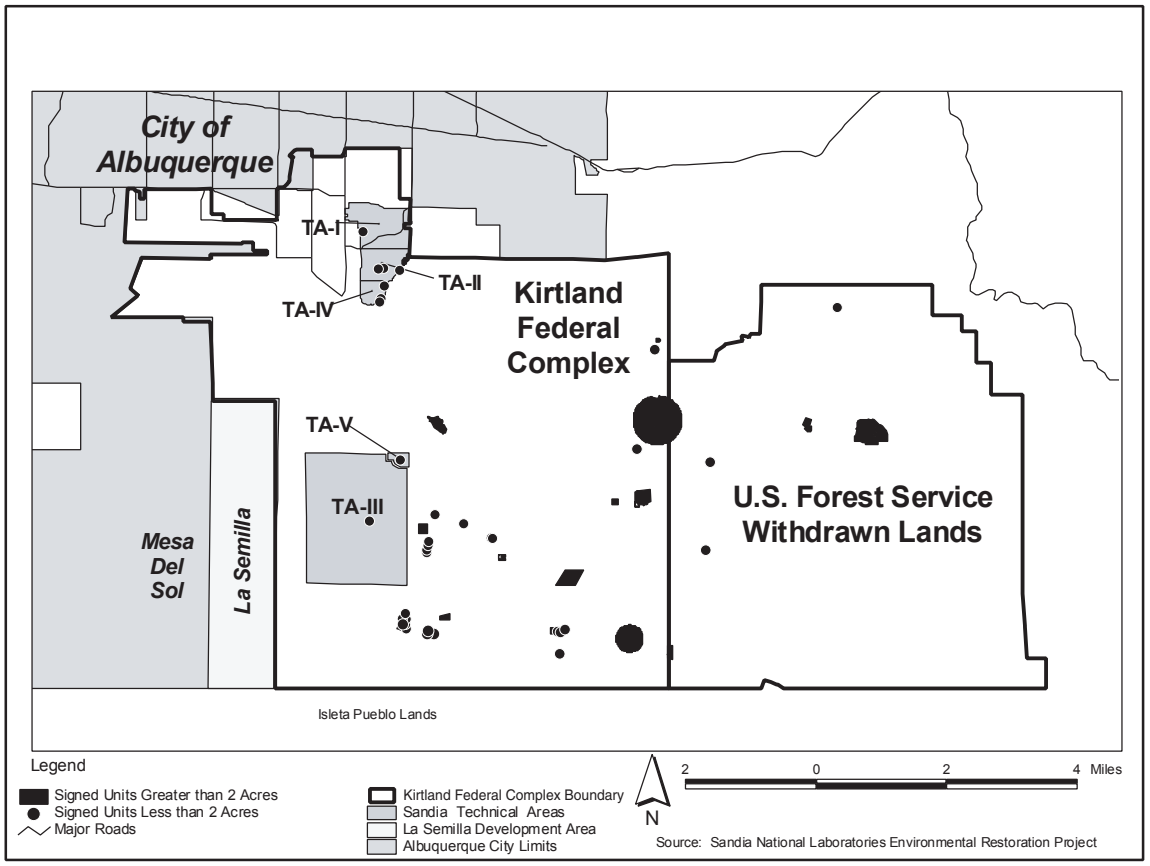

Figure 2.5-1

Sandia National Laboratories/New Mexico, Signed Units Location Map

(Illustrates Sandia National Laboratories/New Mexico's signed units.)

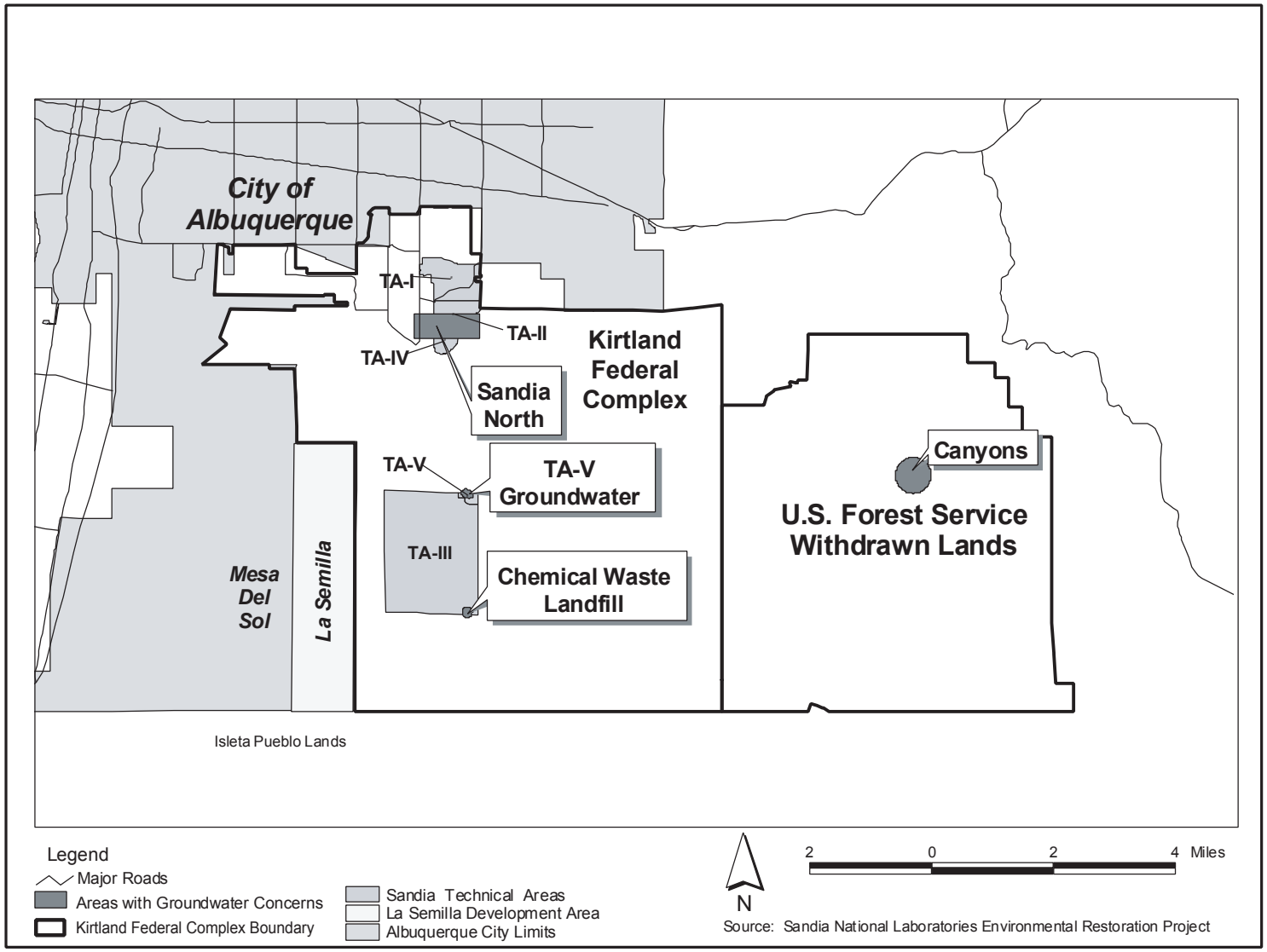

Figure 2.6-1

Sandia National Laboratories/New Mexico, Location of Areas with Groundwater Concerns

(Illustrates the location of Sandia National Laboratories/New Mexico's areas with groundwater concerns.)

2.7 Other Issues

2.7.1 Active Sites

Active sites are those SWMUs that are located at currently used testing facilities. Examples of these sites are:

- The Long Sled Track (SWMU 83 and 26),
- The Gun Facilities (SWMU 84), and
- USAF High Energy Research Test Facility (SWMU 82).

Any physical or ICs that will be applied to these sites will happen only when these sites cease to be active testing facilities and have gone through remediation at some point in the future.

2.7.2 Sites Transferred to KAFB

The ER Project has transferred two sites to KAFB. SNL/NM is no longer responsible for the ICs for these sites.

2.7.3 Newly Discovered Sites

During routine maintenance or other activities at SNL/NM, it is possible to discover legacy waste sites that may not have been identified during the life of the ER Project. The SNL/NM **Environment, Health and Safety (ES&H) Manual,** Chapter 10 "Environmental Protection" Section "10N, Discovering and Reporting a Potential Past Waste Release Site" describes in detail the process of recording a newly discovered site. The current version of Chapter 10 is reproduced in Appendix F. Future versions of this LTES plan will link directly to the latest available ES&H Handbook.

Issue 3: Sites Discovered after ER Project Closure

The current SNL/NM process for reporting a potential legacy waste release site discusses what to do assuming there is an ER Project. This process should be modified to address the tracking and reporting of these discoveries after the project is completed.

2.8 Conclusions

Because SNL/NM has not completed the remediation phase of its ER work, many of the decisions concerning specific physical and ICs for sites have not been determined. Appendix A provides information concerning each site that will be part of the SNL/NM LTES program. The ICs discussed in this table are based upon knowledge of the site. In each case, overlapping physical and ICs were selected to increase the likelihood that failure of any single control would not negatively impact the community.

Issue 4: Information Management and its Relationship to ICs on KFC

SNL/NM will be relying on IMS to track the ICs for each of the sites. Currently, this IMS is not well defined. This IMS system will need to serve SNL/NM, DOE and many different stakeholders. Stakeholders have requested access to ICs information via a publicly available website as well as hard copy in multiple public places. The public does not differentiate between KAFB, SNL/NM, and the DOE. Thought should be given to developing IC processes and an IMS that can be applicable to both stewards and stakeholders.

Finally, little has been said in this chapter about the potential role of local government rules and regulations in IC implementation for LTES. One national group[10] believes that there is such a role and that:

> "Many of the mechanisms that DOE expects to rely on for long-term stewardship are based upon local laws, practices, and institutions. In addition to land use planning and zoning, these include property records offices, building codes, local real estate practices, and local health departments."

DOE and SNL/NM decisions about LTES should be informed by adequate knowledge and understanding of the local laws, practices, and institutions that will enhance effective long-term stewardship.

Issue 5: Involvement of Local Government in Recommendations for IC Systems

Stakeholders have recommended that SNL/NM and DOE continue to work with local government to improve their federal knowledge and understanding of the local laws and other tools that may be used for LTES.

Both monitoring and the existence of an information system are critical to the success of IC implementation. Chapter 3.0 discuses SNL/NM monitoring plans and Chapter 4.0 addresses the informational aspects.

3.0 MONITORING

3.1 Site and Community Environmental Monitoring

A primary goal of an LTES monitoring program is to verify, through measurement and sampling, that the closure activities or remedies for each site continue to be protective of the community and the environment. Environmental monitoring will occur at individual sites and in the broader region—both on and off KFC—to demonstrate that workers, the public, and the environment are being properly protected. Environmental monitoring will be conducted for as long as is necessary with the DOE and SNL/NM accepting responsibility as stewards of this program.

Prior to the drafting of this plan, a citizen group—the **Site Environmental Monitoring (SEM)** Task Group—met for a period of about 10 months to discuss monitoring and physical control issues. Many of the ideas included in this chapter are drawn from that group's report. (The entire citizen report on this subject is provided in Appendix B.)

The SEM and **Community Environmental Monitoring (CEM)** programs should do the following:

- Provide early detection of any contaminant release;
- Identify the source of any contaminants and allow for mitigation before any potential impacts to human health;
- Identify trends in the natural, or unaffected, systems; and
- Verify compliance with environmental regulations and commitments made in regulatory permits or closure plans.

To effectively carry out these goals, SNL/NM must have both an LTES monitoring program (SEM and CEM) and a viable method of communicating the results of the program to interested stakeholders. This chapter addresses the monitoring program. Chapter 4.0 provides a discussion of the informational aspects of LTES.

The key to designing an effective LTES monitoring strategy is to first identify the important contaminant **pathways** present at the site and regional levels. Site monitoring should be tailored to the level of risk of each SWMU. Some SWMUs will require individual monitoring, while others may be monitored as a group.

Appropriate sampling locations will be based upon **topographical**, **hydrological**, and **meteorological** considerations. Monitoring strategic locations provides an indication of the accumulation of contaminants from multiple sites and may be the most cost-effective means of monitoring. In the event that contamination is detected above a predetermined action level, a contingency strategy will be pursued to determine the exact source(s).

Environmental media to be considered in the design of a sampling program at SNL/NM include air, surface and subsurface soils, vegetation, arroyo sediments, groundwater, and surface water (including stormwater runoff and water from springs). Sampling may be

performed directly on the transport medium, such as air or storm/surface-water runoff, or in downwind or downstream media to detect the accumulation of contaminants over time. Direct sampling of air, surface water, and groundwater may be appropriate for those sites with the potential for releases.

3.2 Contaminant Pathways and Environmental Monitoring

The types of monitoring required at various sites, or SWMUs, will depend on the nature of the contaminants present and the potential pathways to **receptors**. Pathways are defined by routes—both direct and indirect—that can lead to inhalation, ingestion, or direct exposure to contaminants. Direct pathways include exposure to radiation from a site, inhalation of airborne contaminated particles, ingestion of contaminated groundwater, exposure to skin, or any other direct exposure to contaminants. Indirect pathways include contaminants that move through the food chain. For example, food could become contaminated by groundwater sources used for irrigation. Pathways in the environment are dependent on geologic and geographic factors, including **soil type** and consolidation, **bedding structures**, surface topography, depth to groundwater, **faults** and **fractures**, and the proximity to **surface-water runoff** channels and arroyos.

The following categories of monitoring are appropriate for potential contaminant pathways:

Groundwater Monitoring – Contaminants on the surface or in the subsurface may be transported to the groundwater by percolation through the **vadose** (or unsaturated) **zone**. Groundwater contaminants could present a direct human exposure pathway through ingestion of contaminated drinking water, or an indirect pathway via irrigation of crops and subsequent ingestion of contaminated foods.

Vadose Zone Monitoring – The vadose zone is the unsaturated zone above the water table (from the surface to the saturated zone). Vadose zone monitoring will primarily consist of near-surface measurements of **soil moisture** and soil gas at engineered closure sites. Any changes in soil moisture or soil gases within an engineered system may indicate a potential mechanism for contaminants to migrate.

Terrestrial Surveillance – Contaminants in soil, sediments, and vegetation could be consumed, allowing contaminants to persist in the food chain.

Air Monitoring – Surface contamination may become airborne and pose a risk to receptors. Airborne contaminants can present a direct human exposure pathway through inhalation and external exposure, or may be deposited elsewhere on soil, vegetation, and surface water, providing a subsequent indirect exposure pathway.

Ambient External Radiation Monitoring – For sites contaminated with radioactive materials, **ambient** radiation measurements may be appropriate.

Surface Water and Stormwater Monitoring – Contaminants present at the surface could be transported by surface-water runoff from a site and subsequently deposited elsewhere on soil, sediments, or vegetation, or carried to a surface-water body. Waterborne contaminants may present a human exposure pathway through ingestion of contaminated water or by ingestion of

contaminated soil or food. In the case of radioactive material, receptors may receive external exposure to contamination deposited by surface waters.

Additionally, SNL/NM may use some of its stewardship sites as test beds for the development of sensors and sensor networks to monitor individual or multiple contaminant pathways.

Issue 6: Needed Legislation for LTES Monitoring

While SNL/NM is currently obligated to perform environmental surveillance in accordance with DOE Orders and permit requirements, there are no regulations specifically addressing LTM. Further, the existing legal framework offers no regulations specific to the vadose zone. Stakeholders have recommended state and federal legislation defining funding requirements for LTES monitoring and describing specific requirements protective of the vadose zone and related potential pathways. Stakeholders believe that specific legislation will lead to more secure LTES funding.

3.3 Decision Logic for Determining Monitoring Methods

Because some ER Project clean-up activities are in progress and the final status of many SWMUs is currently unknown, many details of a long-term environmental monitoring program remain unresolved. However, a basic decision-making process, or decision logic, will serve as a guide for SNL/NM and DOE to develop an effective program as more details become available.

Decision logic diagrams take the form of multiple steps, usually framed as questions, based upon possible scenarios. Movement between the steps depends on “yes” or “no” answers to a logical series of questions. Risk calculations are an integral part of the decision logic process. Figure 3.3-1 shows a portion of a decision logic plan. A more complete example is found in Appendix G.

The decision logic when fully developed will define the LTM strategy and specify monitoring methods for specific sites. Environmental monitoring plans (EMPs) will be developed for each site or group of sites. The plans call for dedicated EMPs for engineered units, signed and fenced units, and other groups of sites.

3.4 Managing Uncertainty with a Matrix

Stewards need to understand the potential for unplanned events to occur and should have contingency plans for addressing these situations before problems occur. Contingencies for unplanned events can be organized and characterized for each engineered unit with a management tool called an uncertainty matrix. Shown below in Figure 3.4-1 is an example of such a matrix. A complete example of an uncertainty matrix is shown in Appendix H. (A RCRA post-closure care plan contains similar information in textual format, rather than a matrix.)

In the final plan, existing emergency notification schedules should be linked to the uncertainty matrix. These schedules identify who should be called to implement appropriate protective actions.

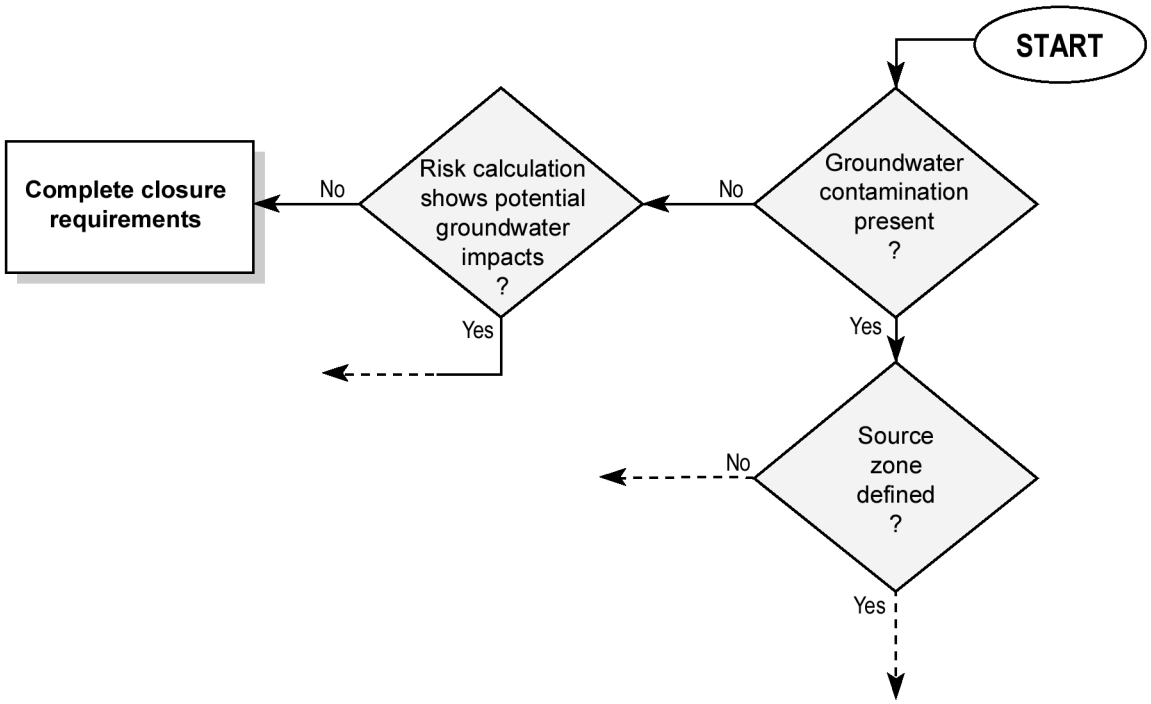

Figure 3.3-1
Example of Decision Logic

(Decision logic is directed by "yes" or "no" answers to questions as in this example.)

Expected Condition	Reasonable Failure	Occurrence Probability	Response Time	Impact	Monitoring Plan	Contingency Plan
Access controls will prevent cover intrusion.	Humans will breach cover and dig in landfill.	Low. Other controls are in place to prevent occurrence.	Short for direct contact of humans.	Cover integrity will be compromised.	Surveillance of cover condition, fences, etc.	Reevaluate remedy if cover breached.

Figure 3.4-1
Uncertainty Management Matrix

(Illustrates an example of an uncertainty management matrix for an access control.)

Issue 7: Negotiating End-Point Decision Logic

Stewards and regulators must negotiate the decision logic used to define an end-point for monitoring prior to any discontinuance of monitoring at a site or group of sites.

3.5 Summary of Current Environmental Monitoring Programs at SNL/NM

SNL/NM's EM Department currently conducts monitoring and surveillance on both community and site-specific bases, including air quality, terrestrial, groundwater, surface-water, stormwater, wastewater, and meteorological monitoring. Information on all of SNL/NM's monitoring and surveillance programs is rolled up annually in a Site Environmental Report.

The current monitoring programs are intended to evaluate potential contaminant pathways (discussed earlier) from ongoing SNL/NM operations. ER monitoring activities are designed to test for contaminants identified by characterization at specific sites.

Regulatory requirements and DOE Orders drive the environmental programs currently in place at SNL/NM. To some extent, these programs—through post-closure RCRA permits and long-term care plans for specific sites—will continue to be the basis for monitoring plans into the future. The scope of SNL/NM's environmental programs is briefly described below.

Groundwater Protection Program (GWPP) – This program places its focus on regional groundwater quality and characterization of groundwater flow. The objective is protection of groundwater from any potential impacts of SNL/NM operations. The GWPP includes the following:

- Monthly water level measurements in 126 wells (including 52 ER project wells), and
- Annual water quality measurements in 14 wells and one spring, analyzed for volatile organic compounds (VOCs), total organic halogens (TOX), phenols, general inorganics, and metals.

The GWPP works closely with the ER Project monitoring programs and its 52 wells. The results of all groundwater monitoring are reported annually.

Stormwater Program – This program currently has two monitoring stations, with six more planned. Stormwater is sampled when flow is present; the samples are analyzed for a variety of chemical and radioactive constituents. This program also is responsible for construction-related fencing (silt fences) and monitoring. Four of the eight stations planned are associated with ER Project sites.

Air Quality Program – There are a total of nine air monitoring stations in conjunction with a network of eight meteorological towers (see below) in this program. Four stations sample particulate matter so small that it can be inhaled (less than 10 micrometers in diameter). Four stations are sampled for 24 hours on a monthly basis to analyze for 25 VOCs. One station conducts continuous sampling for selected contaminants identified by the EPA.

Meteorological Monitoring Program – This program includes a KFC-wide network of eight meteorological towers. The resulting data support modeling efforts for other air quality programs at SNL/NM and emergency management activities. The towers continuously collect data, with the computer information link updated every 15 minutes.

Terrestrial Surveillance Program – In this program, soil, sediment, and vegetation sampling is conducted annually at 39 on-site, 17 perimeter, and 16 off-site locations. The samples—including soil (49), sediment (10), and vegetation (29) samples—are analyzed for metals and radioactive constituents. A program to measure "ambient" existing radiation levels at 34 locations uses **thermoluminescent dosimeters (TLDs)** to take measurements. Data from this program are used to perform trending and other statistical analyses to compare on-site and perimeter results with those from off-site locations.

Ecological Surveillance Program – This program monitors small mammals, large mammals, reptiles, bird populations, and vegetation populations annually. Small mammals, typically field mice, are trapped and analyzed for chemical and radioactive constituents.

In all of these programs, SNL/NM's **Agreement in Principle** with the state of New Mexico calls for state officials to be notified prior to sampling. This in turn allows NMED personnel to observe the sampling and take joint or "split" samples with SNL/NM to verify results.

3.6 Near-Term Required Capabilities for LTES

Actual capabilities needed for LTES monitoring will evolve as the use of the decision-logic approach establishes the specific sites that must be monitored, how they will be monitored, and the requirements for an adequate CEM program. Existing ER Project monitoring activities will be combined with activities of the EM Department**.** Additionally, as a part of the national laboratory system, SNL/NM plans to test internally developed monitoring systems at various LTES sites. Staffing, equipment, and funding requirements can be expected to change as the dynamics of monitoring change over time. For example, a change in regulations can impact risk calculations for sites, or a change in the actual dynamics of a site can cause a change in risk assessment. The availability of new deployable technologies could also impact the monitoring program, requiring ongoing flexibility.

In the case of groundwater, some low levels of contamination may be remediated by natural attenuation of contaminants as a part of stewardship. This means that monitoring will be used to ensure that natural physical and chemical reactions or biological activity in the water and the

surrounding matrix of soil and rock has the effect of removing the contamination over time. In these cases, the selection of monitoring well locations and configurations, based upon flow direction and other dynamics, becomes very important. To establish a viable well network for monitored natural attenuation cases, stewards can choose all existing wells or a subset of wells, while examining the need to drill new ones. In other cases, existing wells may need to be abandoned. Because of the cost of drilling and completing new wells, these decisions can have a major short-term impact on monitoring budgets.

Clearly, periodic technical review and evaluation of the monitoring plans is needed to properly calibrate actual capabilities to varying demands. The development of specific EMPs and procedures will be the responsibility of SNL/NM and DOE technical specialists. However, any significant changes in the plan should be developed with the consultation of those federal, state, county, and city agencies that assist DOE and SNL/NM in judging the effect of monitoring plan changes on the integrity of the overall LTES effort.

3.7 LTM for LTES

In Appendix I of this plan, SNL/NM outlines its long-term groundwater monitoring strategy. This specifically addresses monitoring of those sites which pose a known or potential threat to groundwater. The proposal is based upon groundwater flow and transport models and provides a systematic approach to monitoring this important resource. The proposal uses the concept of "sentry wells" to provide early signs of groundwater problems. In combination with the sitewide GWPP described earlier, this will provide appropriate levels of monitoring protection and, in the worst case, an early warning system for this valuable resource.

Other in-place SNL/NM environmental surveillance programs described earlier will also be used to attain LTM in support of LTES. To meet LTES objectives, some modifications to these programs may be needed.

While most SNL/NM sites have very low potential risk, a more detailed effort is planned for the three engineered units. In the case of these engineered units, specific EMPs will be developed in conjunction with regulators employing uncertainty management matrices. Site-specific EMPs may be appropriate for the CAMU, CWL, and MWL because contaminants will be left in place. A draft of each EMP, or proposed monitoring plan for the three sites, will be attached as appendices to the final LTES plan. The uncertainty matrices, as discussed earlier, will help stewards prepare contingency plans for potential problems before they occur.

In this document, the MWL (see Figure 3.7-1) is used as a case study to discuss some of the necessary elements for a complete monitoring plan. The MWL has become the focus of attention in the community and some have even suggested that stewardship planning not occur until issues surrounding this site can be resolved. The DOE SNL/NM CAB made a number of recommendations about how the MWL should be addressed within the context of stewardship; several of these are addressed here.

Among the requirements in an MWL monitoring plan, consistent with RCRA-based long-term care plans, would be the following:

- Groundwater monitoring for chemical and radioactive contaminants of concern at least annually, and more frequently if appropriate;

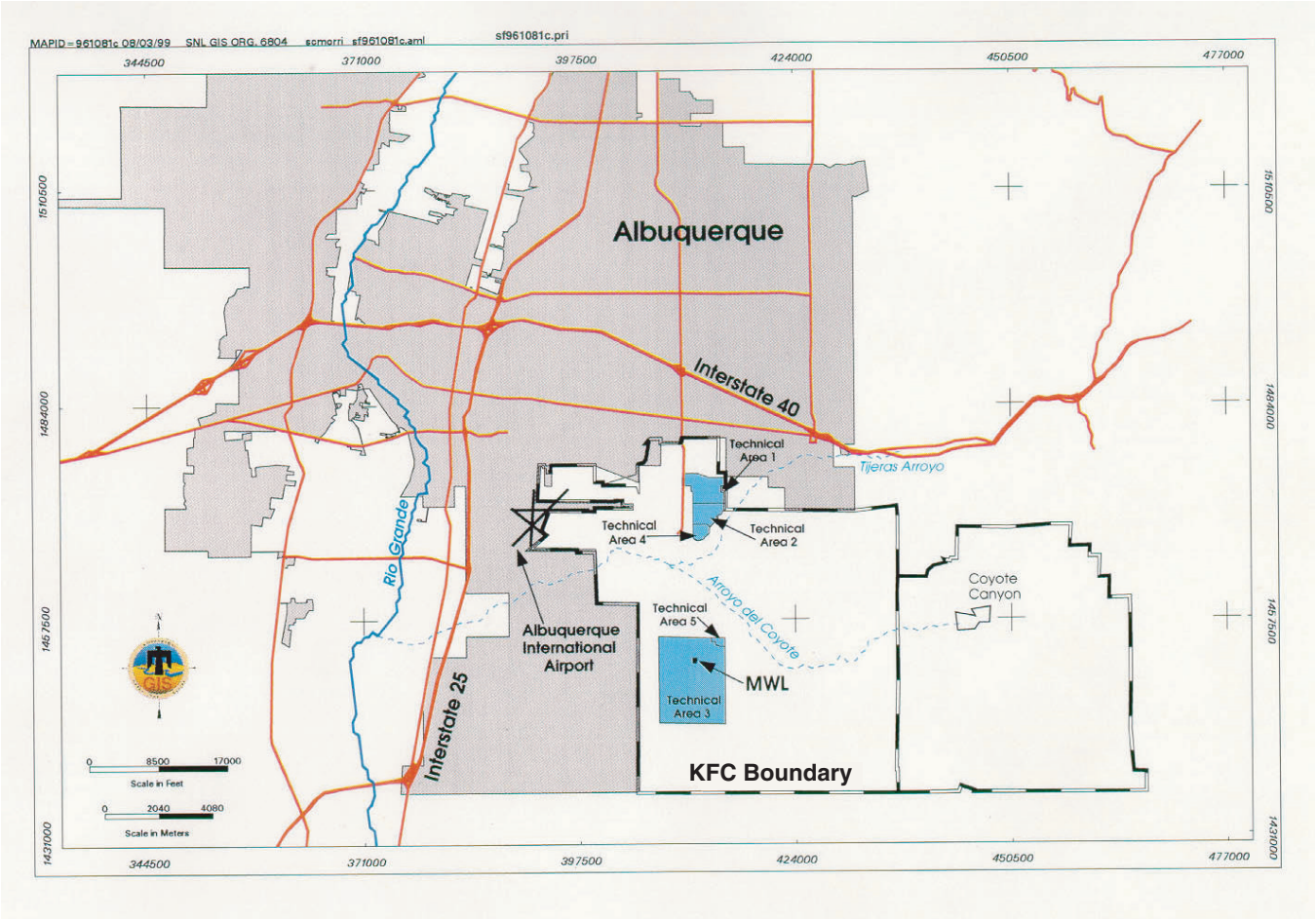

Figure 3.7-1
Mixed Waste Landfill Location Map

(This map shows the Mixed Waste Landfill in relation to the Kirtland Federal Complex boundary and other major features of the City of Albuquerque.)

- Vadose zone monitoring would involve primarily near-surface instruments measuring changes in soil moisture that would indicate failure of an engineered barrier and a potential mechanism for release of contaminants;

- Annual surveillance and maintenance of the engineered cover to prevent release of contaminants to soil and vegetation;

- Air monitoring will occur on an intermittent basis. Routine air monitoring is not planned at the site because of the extremely low results from past monitoring (one millionth of the EPA standards), and the fact that these levels are expected to further decrease as a result of covering the landfill. However, the need for air monitoring may be triggered based on the results from other air sampling stations SNL/NM maintains around KFC;

- Ambient External Radiation Monitoring using TLDs will continue on a KFC-wide basis;

- Surface and Stormwater Monitoring based upon the existing network of monitoring stations;

- Annual reports on monitoring results to regulators and the public through public meetings and an LTES stakeholder information system, still to be developed (see Chapter 4.0); and

- Five-year evaluations of the site based upon annual report data. The evaluation will include the following:
  - Radioactivity levels;
  - State of excavation technologies;
  - Availability of waste disposal paths;
  - Costs versus benefit analysis;
  - Review and analysis of all monitoring data; and
  - Performance of the existing landfill cover.

Important to the monitoring program will be SNL/NM's ability to modify current environmental monitoring programs and systems as needed to address stewardship needs. Also important will be communicating information about the program and the sampling results to the public. Because public confidence in the collected data is important to the success of LTES, SNL/NM's existing data quality assurance requirements will be part of the plan. Once information is collected, processed, and reviewed for quality, it will be made available to the public for review and comment. Details about the format, informational media, and access to the data are discussed in Chapter 4.0.

Issue 8: Direct or Indirect Funding

In the current operations approach, environmental surveillance programs at SNL/NM are funded from an “indirect,” or corporate overhead account. Because indirect funding is generated as a percentage of direct-funded programs, the amount of indirect funds can be drastically impacted by funding cuts. Stakeholders have recommended that DOE and its successor organizations commit to specific, or “direct” funding for these programs. This would make funding more secure in the future.

As mentioned in Chapter 2.0, various levels of administrative and physical controls, dependent on the hazards present, will be instituted to ensure that future activities at the site are restricted in a way commensurate with the designated land use. These controls will be reviewed regularly to determine their integrity. Among the controls are:

- **Administrative Controls** – Deed restrictions, land-use restrictions, and other written devices designed to control future site activities;

- **Physical Controls** – The integrity of physical structures (such as landfill covers, disposal cells, berms, operating remedial systems, gates, and fences); and

- **Contaminant Controls** – Detect and locate any constituent release and migration.

Chapter 4.0 describes SNL/NM information management and how it will bear on LTES.

4.0 INFORMATION MANAGEMENT SYSTEM

Sharing information is essential for an effective LTES program. The goal of a successful IMS is the retention and availability of information, essential to an LTES program. The system must provide information to meet the needs of current and future stewards for adequate evaluation of SWMUs to foster the ongoing protection of human health and the environment.

The LTES IMS must provide information necessary for integrating the many activities of LTES operations and ICs. It will be a key component for establishing a tradition of responsible stewardship that preserves information, ensures its accessibility, and educates future generations

The information system should be complementary to existing SNL/NM and DOE information systems, whose purposes meet essential, long-term needs. Multiple sources and custodians will help ensure that information remains current, accurate, and available.

A citizen group studying LTES in Oak Ridge also expressed that an effective IMS should[11]:

- Be accessible, understandable, and in a format usable by the public;
- Provide and coordinate information that meets the need of current and future city, county, state, and federal stakeholders, specifically with regards to any future property transactions where property might leave federal land ownership status; and
- Make historic and current site-specific environmental contamination and clean-up information available on the Internet.

The following sections specify broad components of an environmental stewardship system and provide guidance for implementation. Since the LTES IMS will be a component of existing information systems, the details of implementation are best specified by owners or custodians of those systems.

4.1 Information Types

As part of the process to define the types of information needed for an LTES IMS, a working group made up of interested individuals from the public met between May 2000 and March 2001. The Institutional Controls and Information Management Task Group educated themselves on the LTES and the complexities of information management. The Task Group developed a partial listing of the types of information recommended for a stewardship IMS (Appendix J). The appendix organizes the types of information needed in the following categories:

Compliance and Reporting Information – This category of information has to do with how SNL/NM and DOE are performing LTES activities. The types of information reported would assist stewards and the public in determining if the LTES efforts are adequate.

ER Site-Specific Information – This category provides detailed information on each site that was characterized by the ER Project at SNL/NM. These data are summarized in Appendix J.

LTES IMS Maintenance and Administration – This information would describe the actual operations of the LTES IMS and provide feedback on how the system's data are being used and how the system might be improved in the future.

Monitoring Data – This category of information pertains to any required LTM at the sites and includes the types of monitoring and the actual data.

Public Outreach Information – Information in this category would be used to determine how public outreach is conducted and to determine if these efforts meet public needs.

4.1.1 Existing SNL/NM Information Systems

Rather than create a new information infrastructure, the LTES IMS will be built upon already established information systems. The advantage here is that the existing systems have established protocols, operating procedures and a history of information management. In concept, records have a defined lifecycle, governed by internal practices and DOE Orders. The SNL/NM Recorded IMS is responsible for the records lifecycle. LTES information is another type of information that will be managed according to this established protocol. Figure 4.1-1 shows the existing lifecycle protocol for SNL/NM records. Figure 4.1-2 illustrates how the existing SNL/NM information system is a layered approach. The LTES IMS will involve many ongoing long-term information sets managed by SNL/NM, including some of the examples shown.

4.1.2 ER and Corporate Records Center

Records held by SNL/NM's Integrated Safety and Security Records Center (ISS RC) are in a cipher-locked, fire-protected room and are managed in accordance with all applicable requirements, including federal, state, and local regulations. In February 1999, the ISS RC was recommended by the National Archives and Records Administration for its “Best Practices” designation in records management programs and for use of barcode technology.

The ISS RC holds all SWMU records until the sites are closed. At closure, a **Site Closure Index** is generated for the site and included in the Safety, Health and Environmental Automated Records System (SHEARS) database. The records and index are imaged for long-term, on-line availability. The hard copy is listed on an Inactive Record Transfer (IRT) Request form and submitted to the SNL/NM’s Inactive Storage organization for long-term maintenance. The SHEARS database is updated with the Inactive Storage box location code, so future searchers will know which box to ask for once the records have been stored. The IRT form serves as a physical index of the contents; hardcopies of these forms are maintained by the ISS RC.

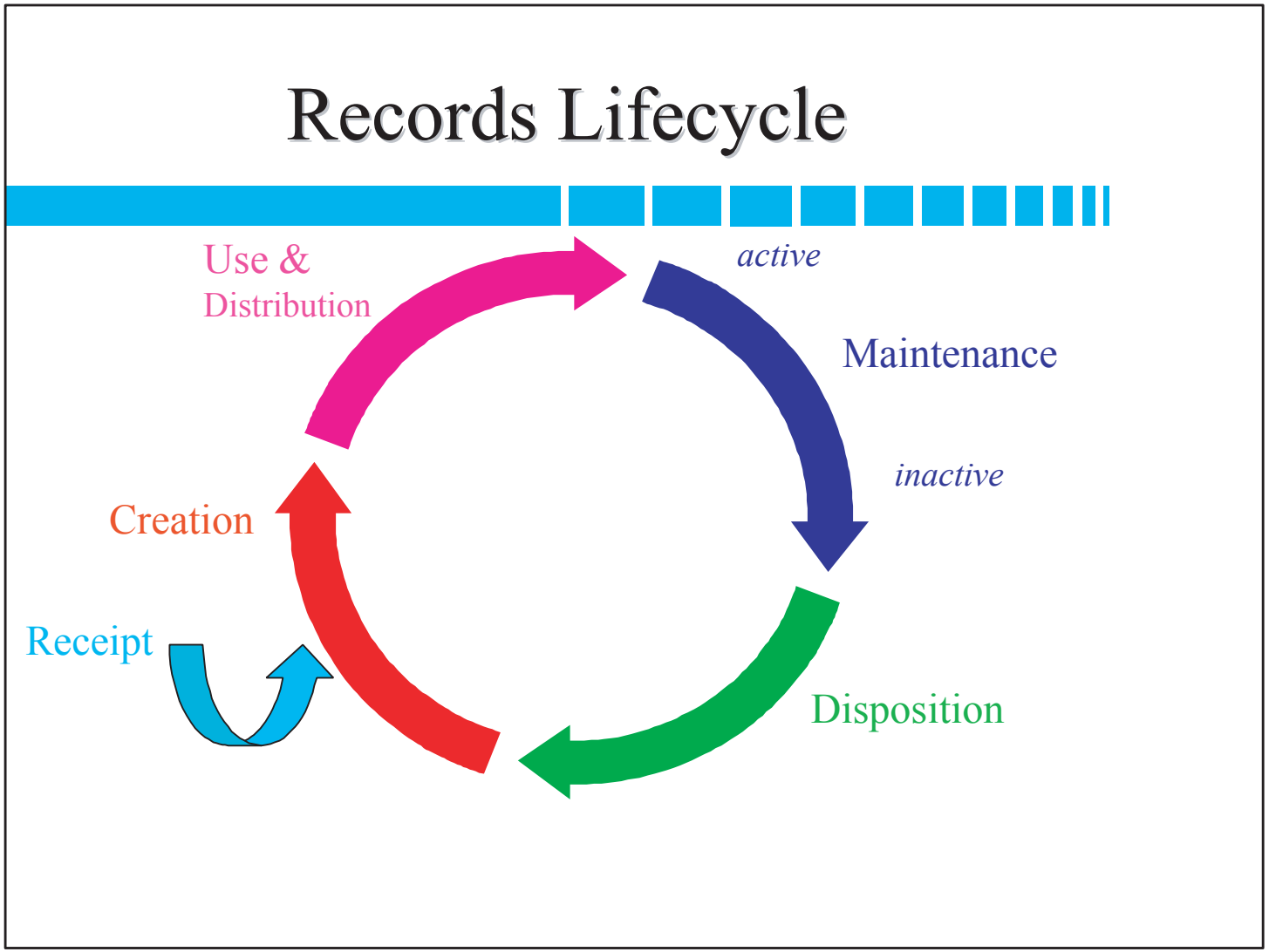

Figure 4.1-1
Records Lifecycle Schematic

Current SNL Information Management Systems

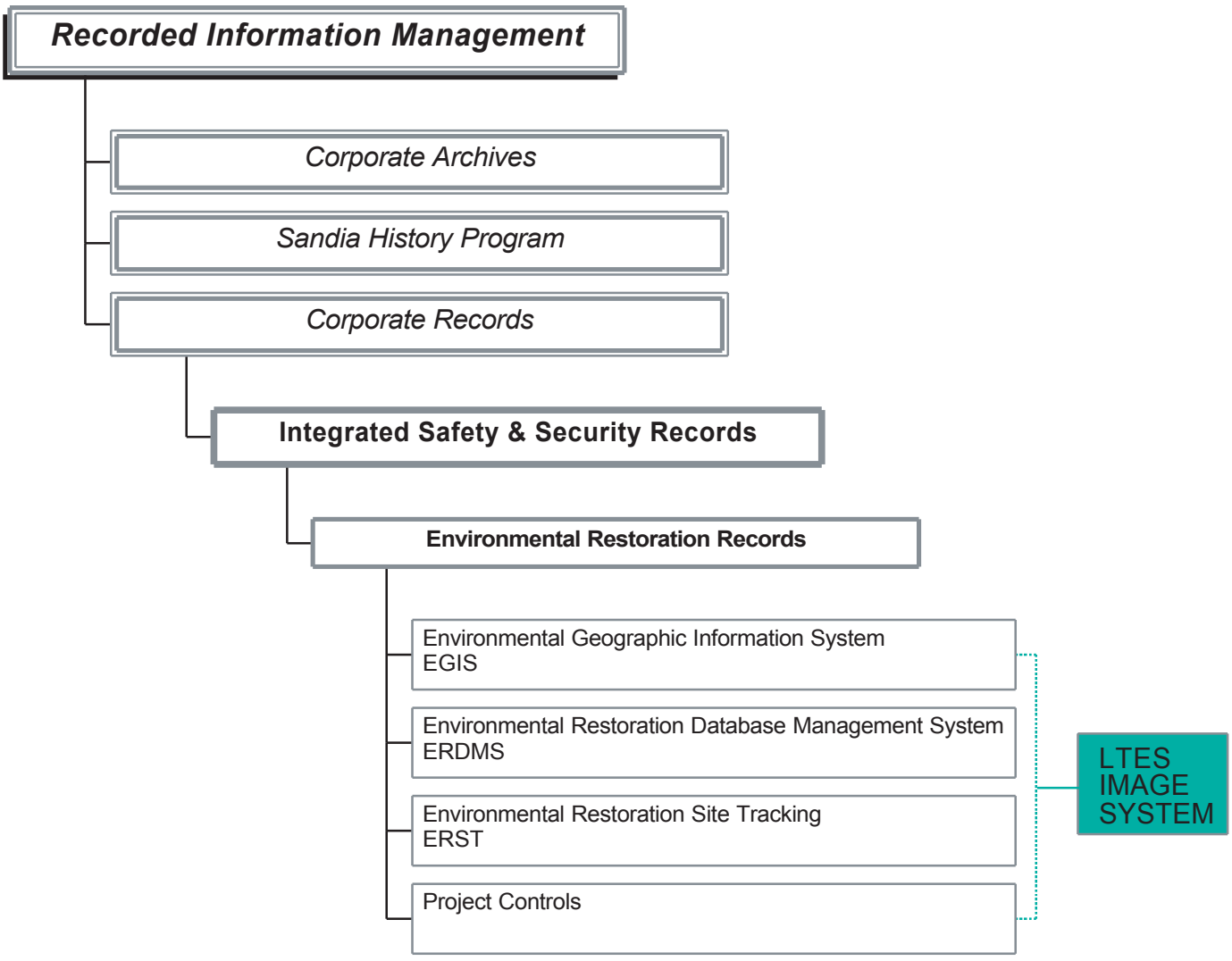

Figure 4.1-2
Hierarchy Relevant to Current Information Management Systems

Issue 9: Limited Access to Current ER Records

Current access to SNL/NM ER information, controlled within the ISS RC, is limited to internal customers, funding organizations, regulators, and external auditors. Stakeholders have recommended that the LTES IMS be built in a manner that enables public access to this system. Maintaining the LTES IMS on the Internet was recommended.

4.1.3 Environmental Geographic Information System

A **Geographic Information System (GIS)** is a special type of system that uses location, such as an X,Y coordinate or latitude and longitude, to identify information. In 1991, the ER Project determined that the best way to store, analyze, and display the ER site data was by GIS technology. The Environmental GIS (EGIS) is the database system that houses these data.

EGIS provides environmentally related scientific data support and analysis through the implementation of integrated GIS, **relational database management system**, and associated analytical software.

EGIS maintains an ARC/INFO™ GIS database that contains more than 2,000 cartographic data layers representing the environmental and physical characteristics of entities within the KFC area and within other areas where SNL/NM has responsibility. EGIS creates maps that portray environmental and clean-up site data with respect to the topographic and environmental setting and with respect to such themes as geology, soil types, vegetation, wells, and contaminant sources. These maps can be created in standard or custom map formats.

4.1.4 ER Database Management System

The ER Database Management System (ERDMS) was developed to compile and store environmental sampling and analysis data collected for the ER Project at SNL/NM. The ERDMS provides computerized records of analytical results. It is used to store and retrieve environmental sampling and analysis data, including field data generated by samplers, on-site laboratories, and contract laboratories. Analytical laboratories generate an electronic data report containing the analytical results. This is verified against the hardcopy report of the data to maintain a high level of data quality before the data are permanently stored.

4.1.5 ER Site Tracking System

The ER Site Tracking System is an online database system that tracks ER sites. It provides summary information on the site history, constituents of concern, current hazards, status of work, future work planned, and waste volumes (estimated or generated).

4.1.6 ER Project Controls

The project control system is designed to collect, aggregate, and store baseline financial data in a structure that can be used as an internal management tool and for external reporting requirements. Information collected involves costs, budgets, and schedule information for the

ER Project. This supports planning, execution, and control of the project. Project control systems are revised periodically to reflect changes made to: (1) implement internal process improvements, and (2) ensure compliance with DOE requirements. Historic information of this type can offer comparisons with contemporary costs to give stewards and stakeholders a financial perspective on LTES.

4.1.7 Future Developments for LTES IMS

The path forward for the LTES IMS will involve both internal SNL/NM issues and issues regarding **data accessibility** for the public. The current ER Project is expected to have an end date in 2009. Between FY 02 and the end of the current ER Project, the following information management tools are expected to be developed:

Internal Sandia Systems – Three products are currently in varying stages of development—an interactive mapping system, an electronic SWMU atlas, and a groundwater information tool.

- The interactive mapping system is a web-based GIS tool that will allow SNL/NM users to access SWMU information at their desktop PC without specialized software. This system will allow SNL/NM users in such groups as Real Estate, Facilities, Environmental Monitoring, and Emergency Management to access and use SWMU information. This system will ultimately be used to access graphical information about SWMUs that will be part of the LTES program. A **beta test** version of this system will be completed by fall 2001.

- An electronic atlas of all SWMUs that have been granted NFA status by the regulators. This will allow the printing of site maps for individual sites. The atlas is expected by fall 2001.

- Groundwater information access tool. This ERDMS team project will allow many different types of queries about groundwater sampling data. A beta test version of this system will be completed by fall 2001.

External Sandia Systems – For external audiences, work on SNL/NM's LTES web site, development of a searchable GIS database, and efforts to make the SHEARS imaged records system available to the public are underway. SNL/NM's LTES web site can presently be accessed at http://www.sandia.gov/ltscenter/.

Data Accessibility – Throughout the meetings with the ICs and Information Management Task Group, members expressed a desire to see an internet website designed and managed as a stewardship information resource. (The entire Task Group report can be seen in Appendix D.) The Task Group suggested information be kept in the following ways:

- On-site or in close proximity to the site and publicly available;
- Within the community
  - In a museum (such as the National Atomic Museum),
  - In public reading rooms, and
  - In university or other public archives; and
- At the National Archives.

Issue 10: Working with Bernalillo County on a Land Status Database

The County of Bernalillo is working with DOE/Oakland to investigate the use of LANDTrek, a DOE database system designed to track land status. The Bernalillo County Environmental Health Department has asked SNL/NM to participate in the development of a publicly accessible internet database that would show contaminated sites and the current land status of each site. Proceeding on such a project will require senior management direction and resource allocation. Working with the county is pertinent to a stakeholder recommendation that SNL/NM and DOE consider the involvement of both local government and the Native American pueblos in the LTES process.

The Task Group also recommended that information be available in a variety of formats, including the following:

- Maps,
- Reports,
- Fact sheets,
- Graphics,
- Videos,
- Signs,
- Symbols,
- Text book information,
- 3-D models of sites, and
- Artistic creations.

With LTES operations beginning in four to five years, time is available to investigate and develop several of these formats for LTES information.

Information Technologies – During meetings with the Institutional Controls and Information Management Task Group, some ideas about information technology were discussed. The LTES information system must remain flexible and be adaptable over time to the rapidly changing information technologies. Low-tech information technologies—such as paper copies—are the most prevalent and perhaps longest lasting. Part of the LTES IMS strategy should be to identify those records that are key to LTES and make paper copies available to the public via reading rooms and archives.

The Task Group recommended that DOE reconsider the location of public reading rooms. Traditionally these have been located either at the University of New Mexico or Albuquerque's Technical Vocational Institute. The group suggested renting space at one of the shopping malls. At malls, there is easy access (including bus service), parking space, and a higher level of convenience for interested citizens. On the other hand, costs for space and library services to control documents would be higher.

High-tech information technologies should also be considered, including internet access portals, the creation of CD-ROMs, live electronic feeds to monitored sites, and other interactive media, the task group reported.

Issue 11: IMS Considerations

Plans call for the current SNL/NM IMS to be modified to address LTES information. Among the issues that will need to be addressed are ownership and maintenance responsibilities for the IMS for stewardship; what software tools and formats will be used to present information; how the IMS will be protected from data loss and accommodate evolving information technology; and LTES IMS funding.

5.0 DOE AND SNL/NM MANAGEMENT OF LTES

It is important that LTES Management is planned, executed, and administered in keeping with sound management principals. Understanding the roles and responsibilities of those stewards and stakeholders involved in LTES, including the regulators and the public in open communication, adhering to a schedule and a budget in executing stewardship, and providing performance measures for LTES are all part of this process.

Because this is intended to be a "living document" that evolves as the operational phase of LTES approaches and even after it begins, the management view at this time is necessarily one of the "big picture." As details on stewardship execution, stakeholder communication, and funding issues become known, this chapter will become more detailed.

The present chapter includes a description of the following:

- Organizations involved in LTES planning and implementation,
- LTES public participation efforts,
- LTES schedules,
- A process for changes to the LTES plan,
- Performance assurances,
- Deliverables, and
- Budget information.

5.1 Organizations

The organizations involved in stewardship include

- DOE,
- SNL/NM,
- The regulators, such as the EPA and NMED, and
- Stakeholders.

5.2 DOE

DOE is responsible for stewardship funding, regulatory interpretation, enforcing and managing land use, and tasking its contractor, SNL/NM, to plan for and implement LTES. DOE Headquarters (DOE/HQ) provides national policy guidance, while the DOE/AL is responsible for programmatic guidance. The DOE's KAO provides technical and administrative oversight and assists in the implementation of higher-level DOE guidance. In the event that DOE leaves Albuquerque or no longer exists, the ultimate responsibility for stewardship will continue to reside with the federal government.

5.3 SNL/NM

SNL/NM is responsible for preparing and implementing LTES plans for DOE. LTES will require:

- Ownership by DOE and SNL/NM senior management,
- Public participation and community relations,
- Site and environmental monitoring,
- Site maintenance,
- ICs, and
- Information management.

After the ER Project is complete, SNL/NM will most likely place LTES responsibilities within its Laboratory Services organization. SNL/NM Laboratory Services has an ongoing environmental surveillance program that performs activities, such as monitoring, maintenance, information management, and reporting. Other SNL/NM Laboratory Services organizations, including safety, will also be involved in LTES. All work associated with LTES must be done in compliance with SNL/NM health and safety policies.

Issue 12: Transition from ER to Laboratory Services

Two SNL/NM organizations have signed a MOU to begin discussion on how to transition LTES responsibilities from the ER Project to organizations within Laboratory Services. (See Appendix K for full MOU.) The goal of the discussions is to lead to a detailed plan for the orderly transition of LTES from the ER to the Laboratory Services organization(s). The plan will be developed over the next two to four years and may be attached to future versions of this LTES plan. Additional SNL/NM organizations should be involved in the LTES effort.

5.4 The Regulators

Currently, the NMED's Hazardous Waste Bureau (HWB) has the regulatory authority for the HSWA and RCRA permit with DOE and SNL/NM. NMED's Groundwater Quality Bureau has regulatory authority over groundwater contamination and has draft guidance for monitored natural attenuation. NMED's Surface Water Quality Bureau has regulatory authority over stormwater from run-on and run-off of SWMUs. The EPA has regulatory authority over the CAMU. DOE Environmental, Safety and Health Division has oversight responsibility for any radiological releases from SWMUs based upon the requirements of DOE Order 5400.5, Radiological Protection of the Public and the Environment.

Issue 13: Varying Organizations and Lines of Authority

There are a variety of organizations with varying regulatory authorities. Current planning for LTES should integrate communication across these entities. It is essential for these regulatory interfaces to continue and to be streamlined whenever possible.

5.5 Stakeholders

Stakeholders include, but are not limited to: KAFB, the USFS, the City of Albuquerque, Bernalillo County, NMED's Oversight Bureau, the Isleta Pueblo, representatives of various environmental organizations, and private citizens. Stakeholders from most of these organizations and the interested public have been involved since the first LTES public meeting in May 2000. Stakeholders have a responsibility to continue to participate in LTES.

5.6 Public Participation Activities

SNL/NM understands that working with the community on environmental stewardship issues is both a responsibility and a "best practice" that will lead to a successful effort and the building of increased trust. All of the LTES task groups recommended an "open door" policy for the community. They suggested mechanisms for outreach and communication including routine and nonroutine meetings, visitor center presentations, or museum displays. Task members agreed that without timely feedback, stewards risk the loss of a strong focus on community concerns.

The DOE agrees that public participation enhances credibility and contributes to an understanding of environmental remediation and stewardship. SNL/NM also has a responsibility to adhere to DOE's Revised Public Participation Policy Guidance. This guidance states in part that, "the public is entitled to participate in DOE decision-making processes and the DOE encourages such participation." Furthermore, "this enables DOE to make more informed decisions, improve the quality of decisions through collaborative efforts, and build mutual understanding and trust between DOE, the public it serves, and the communities that host its facilities."[12]

During discussions on public participation, members of the SNL/NM and DOE LTES Management Task Group created a conceptual view of the roles of public outreach in environmental stewardship. This is shown in Figure 5.6-1.

Advice from these stakeholders has led to a plan that will include ad hoc working groups as needed to deal with specific LTES issues. The plan is spelled out in some detail in Appendix D. As an example, the LTES Management Task Group outlined the following:

- Establish a Stewardship Outreach Working Group (SOWG) composed of the public and other interested parties;
- Establish a body of material for the group to use in their presentations and outreach efforts; and
- Give presentations on LTES to schools, community groups, and other interested organizations.

Issue 14: Need for Dedicated Funding for Outreach

Consistent outreach and education via a SOWG will need dedicated funding and performance assurances. It will also require the cooperation of Albuquerque Public Schools and other local government entities to be successful.

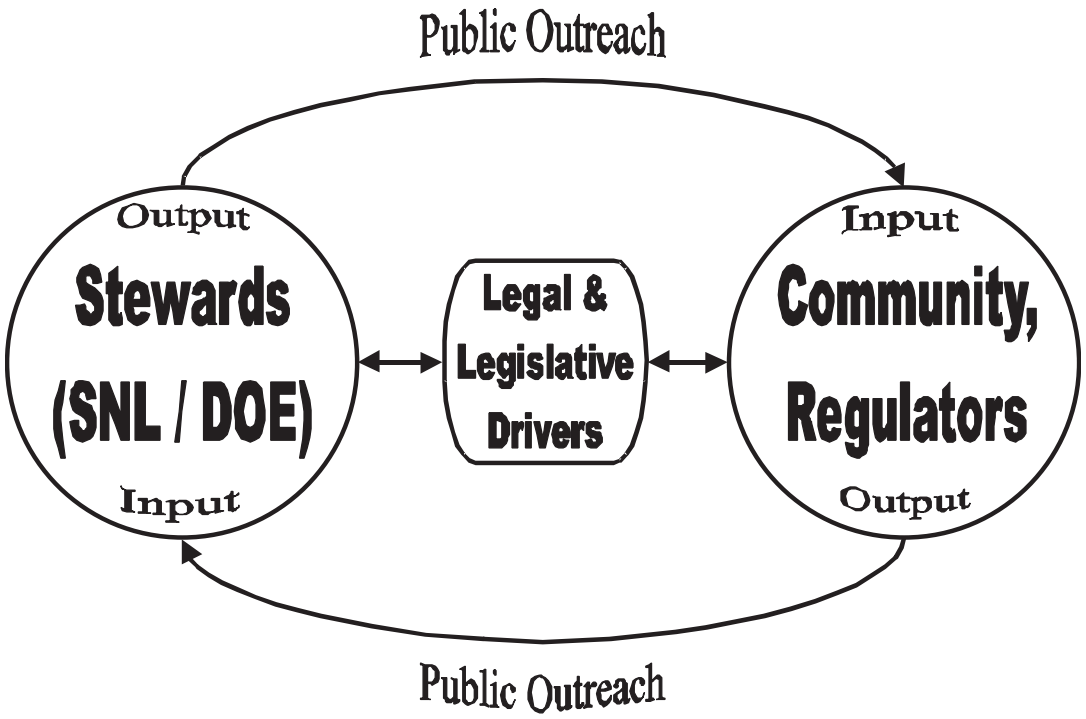

Figure 5.6-1
Conceptual Idea of Public Participation in the LTES Process

Issue 15: Details of a Public Participation Program

Public input will be important in building an LTES program that has the trust of the interested stakeholder groups. Appendix D contains a plan for public participation in some detail. Determining how appropriate working groups would be triggered for formation and supported is evolving as discussions continue with the community.

5.7 Schedule

The DOE/AL budget process presently considers LTES needs through the year 2070. That date represents the limits of the budget planning tool, not a decision to terminate funding. Citizens have demanded a commitment to funding beyond 2070 and this plan acknowledges that demand.

A long-term project, such as LTES, presents a unique management challenge. For example, the National Academy of Sciences[13] has pointed out the potential for failure of ICs in the future and made recommendations for prevention of these failures. These recommendations, such as redundancy, will be incorporated into ICs planning.

5.8 Changes to the Plan

The goal of this plan is to be dynamic, adaptive and self-correcting, not static or inflexible. The plan must never be viewed as finished or "set in stone." Between now and when LTES actually begins, SNL/NM will formally revisit, review, and revise the plan every other year. Following the start of LTES, plans will be revisited periodically (approximately every five years) to determine if the plans are still valid or use the most cost-effective technology.

5.9 Performance Assurances

The current RCRA and HSWA permit requirements do not include direct LTES requirements. However, compliance with post-closure requirements and long-term care plans required by the permit are types of performance assurance. Based on existing systems, to be adapted to LTES, it can be said that the entire stewardship program will incorporate assurances of performance—from the responsible collection of data through management activities and coordination with various stakeholders and regulators.

5.10 Budget

In Figure 5.10-1, the current LTES budget estimate is approximately one to two million dollars per year. The red line represents LTES spending as the blue ER Project line declines.

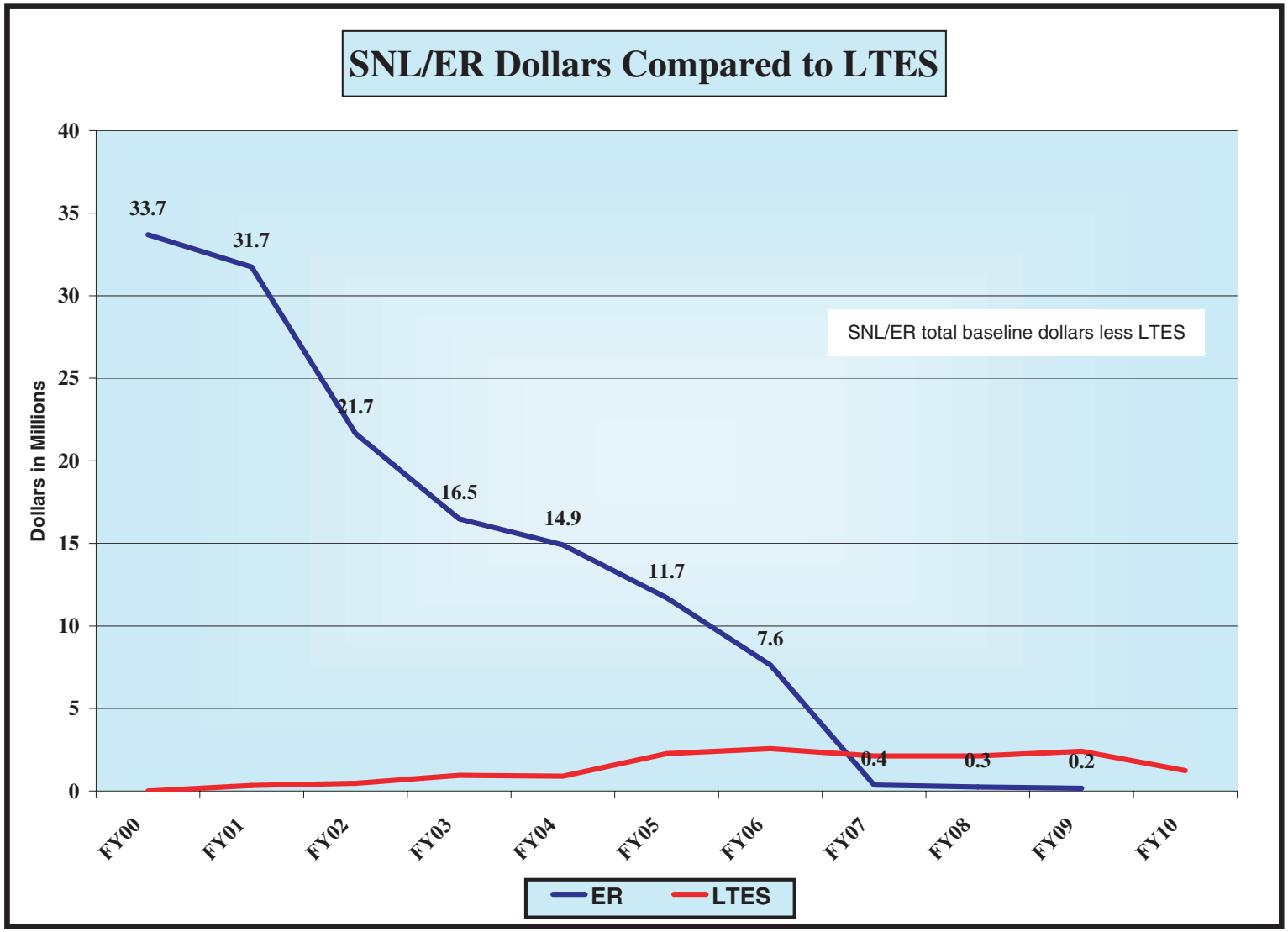

Figure 5.10-1
Transition from Environmental Restoration Project Closure to Long-Term Environmental Stewardship

The LTES budget includes:

- Public participation and community relations,
- Dedicated outreach programs,
- Site and environmental monitoring,
- Site maintenance,
- ICs,
- Information management,
- Contingency funding,
- GIS, and
- Management.

A significant portion of the budget is required to pay for groundwater monitoring and well maintenance and replacement. Figure 5.10-2 shows a breakdown of the LTES budget.

The challenge will be to effectively manage stewardship in the face of funding limitations and competing national priorities. Funding for DOE ER Projects is provided through annual congressional appropriations resulting from the federal budget process. Each year, the SNL/NM budget request is forwarded along with the budget requests for the other DOE/AL sites and programs to DOE/HQ and ultimately to Congress. This process introduces uncertainties that form the basis for funding concerns.

Issue 16: LTES Funding Mechanism

Stakeholders have recommended that DOE continue to study how to establish a stable funding commitment for LTES, by considering conventional and more creative mechanisms.

5.11 Deliverables

LTES deliverables will be the measure of environmental stewardship performance. Deliverables may include reports, permits, presentations, meetings, or public education events. Examples of presentations may include discussions of site end-use changes and release or identification of new contaminants. Deliverable objectives may be specified in some form of requirement from regulators, as appropriate. Closure plan requirements are one model of such a requirement. (See also discussion of information deliverables in Chapter 4.0.)

Issue 17: Planning for LTES Performance Measures

Planning is still required to specify LTES deliverable goals depending on what regulatory course of action is taken. This must be resolved first by the regulators, then addressed by LTES managers.

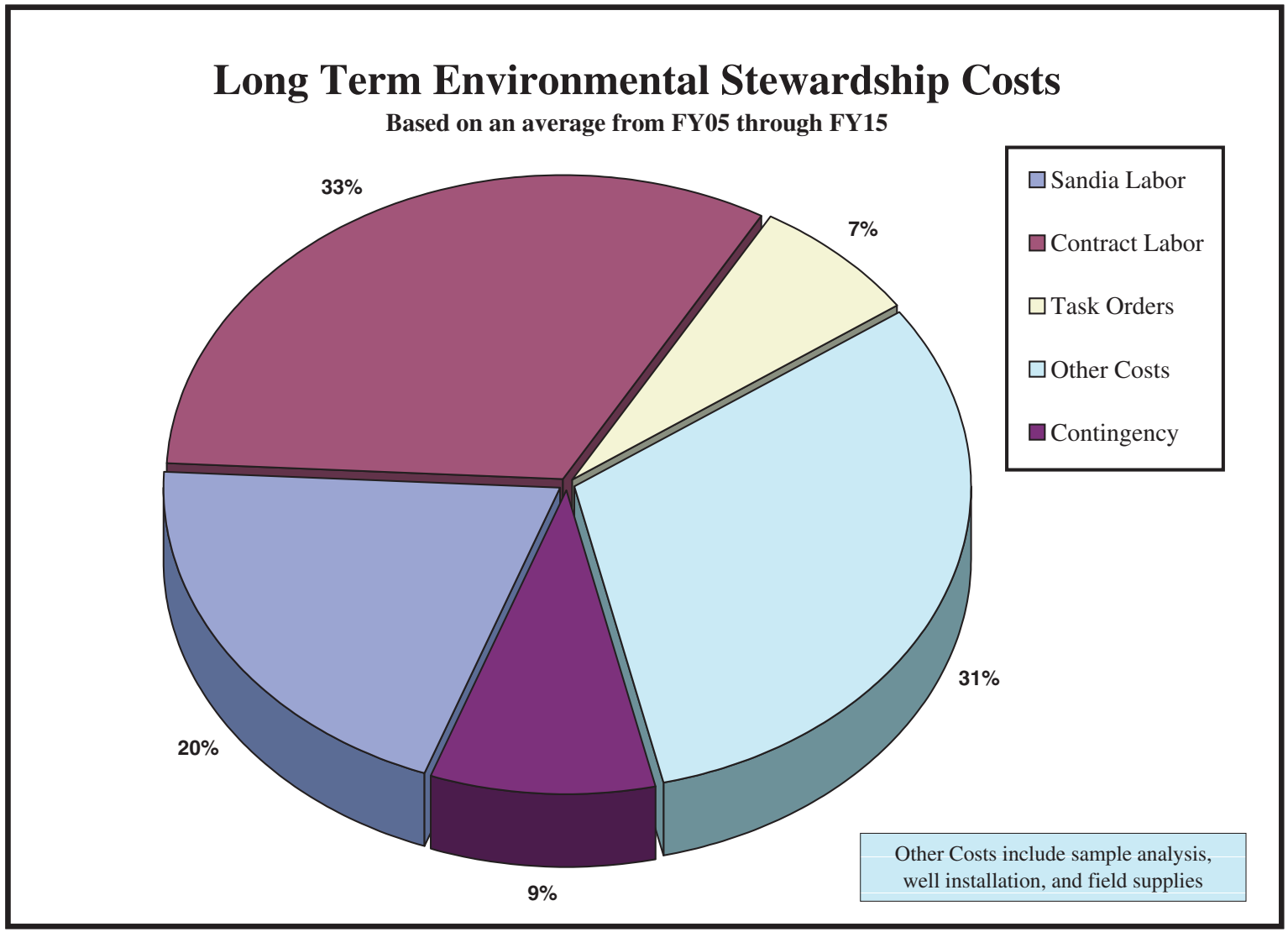

Figure 5.10-2
Breakdown of Budget in a Typical Year

6.0 MOVING THE LTES PLAN FORWARD

The issues outlined in this section form the core of an "action plan" that must now be carried forward if the plan is to develop within the next few years. Listed below is a summary of concerns and recommendations, taken from the “Issues” boxes of the earlier chapters, that need to be addressed and suggestions for responsible parties. As these issues are resolved, the LTES plan will be revised.

6.1 LTES Monitoring

While SNL/NM is currently obligated to perform environmental surveillance in accordance with DOE Orders and permit requirements, there are no regulations specifically addressing LTM. Further, the existing legal framework offers no regulations specific to the vadose zone. Stakeholders have recommended state and federal legislation defining specific requirements for LTES monitoring and protection of the vadose zone and related potential pathways. Stakeholders believe that specific legislation will lead to more secure LTES funding.

Resolution of this issue would involve state legislators, with guidance from NMED and EPA regulators. SNL/NM and DOE can play an advisory role in this process, based on its positive monitoring experience. SNL/NM currently conducts vadose zone monitoring on its engineered units, such as the CAMU, in coordination with the EPA. Local governments, including city, county, and tribal, are also keenly interested in vadose zone monitoring.

6.2 Negotiating End Point Decision Logic

Decision logic used to define an end-point for monitoring must be negotiated with the stewards and regulators prior to any discontinuance of monitoring at a site or group of sites. Currently, RCRA post-closure requirements would define the extent of monitoring and include the endpoint when appropriate.

This is an issue for discussions between NMED, SNL/NM, and DOE representatives. In the future city and county representatives may be included.

6.3 Direct or Indirect Funding

In the current operations approach, environmental surveillance programs at SNL/NM are funded from an “indirect,” or corporate overhead account. Because “indirect” funding is generated as a percentage of direct-funded programs, the amount of indirect funds can be drastically impacted by funding cuts. Stakeholders have recommended that DOE and its successor organizations commit to specific, or “direct” funding for these programs.

This is an issue for DOE/HQ in coordination with local DOE offices. These discussions may be affected by stakeholder influence on federal legislative entities.

6.4 Interagency Consultations

SNL/NM is wholly contained within KFC, so many of the ICs will need to be established through interagency consultation. In January 2001, an initial “kick off” meeting of federal LTES stewards took place, with the goal to work through issues concerning ICs. Another challenge will be development of redundant planning capabilities for LTES participants. Participants are DOE, DOD, USFS, and BLM. At present, this group plans to meet quarterly.

6.5 DOD and DOE Access Agreements

Current land-use permits between DOE and KAFB include language for environmental responsibilities. Sites that do not currently have land use permits are covered under an agreement between DOE and the USAF (dated December 7, 1994.) The agreement allows entry on USAF lands to "conduct environmental surveys to determine to what extent, if any, the areas require environmental restoration." If long-term restoration is required at any of these sites, then a land-use permit will be established.

6.6 Sites Discovered After ER Project Closure

The current SNL/NM process for reporting a potential legacy waste release site discusses what to do assuming there is an ER Project. This process should be modified to address the tracking and reporting of these discoveries after the project is completed.

This issue is best addressed by representatives of SNL/NM's Environmental Monitoring and ER departments in consultation with the ES&H Manual authors.

6.7 IMS and Its Relationship to ICs on KFC

SNL/NM will be relying on an IMS to track the ICs for each of the sites. Currently, this IMS is not well defined. Stakeholders have recommended access to ICs information via a publicly available website and hard copy in multiple public places – such as store front information centers, libraries, or reading rooms. Currently, the public does not differentiate between KAFB, SNL/NM, and the DOE. Thus thought should be given to developing IC processes and IMSs that can be applicable to all tenants.

Information specialists from KAFB, SNL/NM, and DOE in conjunction with stakeholders can best address these requirements and issues.

6.8 Involvement of Local Government in Recommendations for IC Systems

Stakeholders have recommended that SNL/NM and DOE continue to work with local government to improve their federal knowledge and understanding of the local laws and other tools that may be used for LTES.

This issue can best be dealt with by consultation between legal and other representatives of DOE, SNL/NM, and local and tribal government.

6.9 Limited Access to Current ER Records

Current access to SNL/NM ER information is limited to internal customers, funding organizations, regulators, and external auditors. Stakeholders have recommended that the LTES IMS be built in a manner that enables public access to this system. Maintaining the LTES IMS on the internet was recommended.

Information specialists from DOE, SNL/NM working in conjunction with stakeholders can address this issue.

6.10 Working with Bernalillo County on a Land Status Database

The County of Bernalillo is working with DOE/Oakland to investigate the use of LANDTrek, a DOE database system designed to track land status. The Bernalillo County Environmental Health Department has asked SNL/NM to participate in the development of a publicly accessible internet database that would show contaminated sites and the current land status of each site. The stakeholders recommended SNL/NM and DOE consider the involvement of both local government and the Native American pueblos in the LTES process.

Real estate specialists and software experts from DOE, SNL/NM, and the county should be able to address this issue.

6.11 IMS Long-Term Ownership and Maintenance

Plans call for the current SNL/NM IMS to be modified to address LTES information. Among the issues that will need to be addressed are ownership and maintenance responsibilities for the IMS for stewardship; what software tools and formats will be used to present information; how the IMS will be protected from data loss and accommodate evolving information technology; and LTES IMS funding.

Addressing this collection of considerations will involve a mix of managers and information technologists from SNL/NM, DOE, and KAFB.

6.12 Transition from ER to Laboratory Services

SNL/NM organizations have signed a MOU to begin discussion on how to transition LTES responsibilities from the ER Project to organizations within Laboratory Services. (See Appendix K for full MOU.) The goal of the discussions is to lead to a detailed plan for the orderly transition of LTES from the ER to the Laboratory Services organization(s). The plan will be developed over the next two to four years and may be attached to future versions of this LTES plan.

Additional organizations at SNL/NM should become involved in the LTES effort. This is an issue to be resolved internally at SNL/NM by management and staff from the affected groups, with coordination from the SNL/NM Leadership Team.

6.13 Varying Organizations and Lines of Regulatory Authority

There are a variety of organizations with varying regulatory authorities. Current planning for LTES, should integrate communication across these entities. Currently the NMED's HWB has the regulatory authority for the HSWA and RCRA permit with DOE and SNL/NM. NMED's Groundwater Quality Bureau has regulatory authority over groundwater contamination. NMED's Surface Water Quality Bureau has regulatory authority over storm water from run-on and run-off. The EPA has regulatory authority over the CAMU. DOE Environmental, Safety and Health Division has authority for any radiological releases from sites based upon the requirements of DOE Order 5400.5, Radiological Protection of the Public and the Environment.

Because the regulatory picture is not likely to be simplified in the near term, the resolution of LTES issues lies with efforts of DOE and SNL/NM to continue to identify the appropriate regulatory group and other affected groups in its early considerations of any LTES issue.

6.14 Need for Dedicated Funding for Outreach

Stakeholders have recommended consistent outreach and education via a Stakeholder Outreach Working Group that will require dedicated funding and performance assurances. It will also require the cooperation of Albuquerque Public Schools and other local government entities to be successful.

A variety of stakeholders will be needed to address this issue. Funding considerations reach to DOE/HQ, while the working group itself will need to draw from a wide population of interested stakeholders.

6.15 Details of a Public Participation Program

Issue 15: Details of a Public Participation Program

Public input will be important in building an LTES program that has the trust of the interested stakeholder groups. Appendix D contains a plan for public participation in some detail. Determining how appropriate working groups would be triggered for formation and supported is evolving as discussions continue with the community.

Stakeholders have already expressed a great deal of interest and spent more than a year working with DOE and SNL/NM on LTES issues, including public participation. Utilization of a community office for a continuing dialog on what the LTES public participation program will look like seems an appropriate step. This issue can be resolved by discussion between the public, SNL/NM, and DOE/KAO.

6.16 LTES Funding Mechanism

Stakeholders have recommended that DOE continue to study how to establish a stable funding commitment for LTES, by considering conventional and more creative mechanisms.

6.17 Planning for LTES Performance Measures

Planning is still required to specify LTES deliverable goals depending on what legislative course of action is taken. This must be resolved first by the regulators, then addressed by LTES managers.

Next, Chapter 7.0 outlines a chronology and process for encouraging public participation in this plan.

7.0 CHRONOLOGY OF PUBLIC PARTICIPATION IN LTES

September 1999	LTES first addressed by DOE CAB
May 2000	First public meeting for stakeholders to discuss LTES
May 2000—July 2001	Task groups of stakeholders meet and formulate recommendations for plan
August 22, 2001	Task group members and other interested stakeholders begin review of draft plan
August 29, 2001	Public meeting for first review of draft plan
September 24, 2001	First of multiple public comment periods closes

Stakeholder comments on the plan are included in Appendix L.

8.0 GLOSSARY

Active Institutional Controls (ICs) – The concepts of active and passive controls have long been understood to apply to the long-term management of radioactive waste. These controls are described in 40 CFR Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes. Active controls require clear institutional and human responsibilities and the active performance of responsibilities, such as:

- Controlling access to a disposal site by means such as guards;
- Performing maintenance operations or remedial actions at a site;
- Controlling or cleaning up releases from a site; or
- Monitoring parameters related to disposal system performance.

Administrative Controls – Deed restrictions, land-use restrictions, and other written devices designed to control future site activities.

Agreement in Principle – This is an agreement with the NMED to establish a working relationship with SNL/NM involving cooperation in a number of areas, including the sharing of data, to expedite the clean-up process.

Air Quality Program – The SNL/NM program involves a total of nine air monitoring stations in conjunction with a network of eight meteorological towers. Four stations sample particulate matter so small that it can be inhaled (less than 10 micrometers in diameter). Four stations are sampled for 24 hours on a monthly basis to analyze for 25 VOCs. One station conducts continuous sampling for selected contaminants identified by the EPA.

Ambient – Meaning "part of the surroundings."

Ambient External Radiation Monitoring – For sites contaminated with radioactive materials, ambient radiation measurements may be appropriate.

Base Realignment and Closure (BRAC) – A DOD process to look at various military installations and make recommendations on their closure or continued operations in the best interests of the U.S. military as a whole.

Bedding Structures – Sedimentary layers in a rock. The beds are distinguished from each other by grain size and composition, such as in shale and sandstone. Subtle changes, such as beds richer certain minerals, help distinguish bedding. Most beds are deposited essentially horizontally.

Beta Test – Secondary level testing of a product or instrument, typically following its limited introduction into use.

Chemical Waste Landfill (CWL) – One of three engineered sites at SNL/NM, the CWL was used as a repository for laboratory chemical and other types of waste from 1962 to 1984. The 1.9 acre site is currently being excavated as a part of the SNL/NM remediation effort.

Citizen Advisory Board (CAB) – From FY 1995 through FY 2000, SNL/NM and the DOE supported a Site Specific Advisory Board to study and give recommendations on ER Project and related activities. In 2001, a Community Resources Information Office replaced the active board by coordinating a number of active working groups comprised of interested citizens and other stakeholders.

Cleanup – The process of addressing contamination problems in accordance with environmental and health requirements. Often used by the public synonymously with "remediation," "cleanup" as used here does not imply that all hazards will be removed from the site. Remediation also involves passive measures, such as landfill covers, while cleanup has the more active definition of removing contamination from a site.

Closure – A condition in which the cleanup of a site is considered to be complete, excluding any long-term surveillance and monitoring requirements. Releases to the environment have been cleaned up to standards set by the regulators or are contained or are the object of long-term treatment or monitoring programs. Or, a condition where investigation is complete and no contamination which is a risk to human health or the environment has been found. Closure designations can be revoked by the regulator if new information becomes available or a change in site status occurs.

Community Environmental Monitoring Program (CEM) – A program that monitors a variety of environmental media (air, groundwater, soils) in a region extending beyond the KFC boundaries into neighboring communities.

Compliance and Reporting Information – This category of information has to do with how SNL/NM and DOE are performing LTES activities. The types of information reported would assist stewards and the public in determining if the LTES efforts are adequate.

Comprehensive Environmental Assessment and Response Program (CEARP) – An EPA program designed to identify, assess, and remediate potentially hazardous waste sites.

Contaminant Controls – Physical controls or ICs to help detect and locate any constituent release and migration.

Conditional Release Sites – If a site, or SWMU, has residual contamination above regulatory levels, it may still be appropriate for some land uses, but not for all. Just as there is a broad range of residual contamination possibilities, there is a range of possible uses. Approval for these uses would be determined using risk-based criteria with concurrence of the regulators.

Corrective Action Management Unit (CAMU) – This is a storage, treatment and permanent containment site for wastes derived from the excavation of SNL/NM's CWL.

Data Accessibility – Throughout the meetings with the ICs and Information Management Task Group, members expressed a desire to see an internet website designed and managed as a stewardship information resource. (The entire Task Group report can be seen in Appendix D.) The Task Group suggested information be kept in the following ways:

- On site or in close proximity to the site and publicly available
- Within the community
  - In a museum (such as the National Atomic Museum)
  - In public reading rooms

  - In university or other public archives
- At the National Archives.

Decision Logic – Decision logic is a process to determine what sampling, monitoring, or other actions may be appropriate at a SWMU. Decision logic diagrams take the form of multiple steps, usually framed as questions, based upon possible scenarios. Movement between the steps depends on "yes" or "no" answers to a logical series of questions.

Department of Defense (DOD) – The cabinet-level department charged with USAF operations, including operations at KFC.

Department of Energy (DOE) – The cabinet-level department charged with development and management of the U.S. nuclear weapons stockpile as well as other national security, energy, science and environmental quality responsibilities. As such, the DOE provides federal oversight and funding for SNL/NM.

Ecological Surveillance Program – This program monitors small mammals, large mammals, reptiles, bird populations, and vegetation populations annually. Small mammals, typically field mice, are trapped and analyzed for chemical and radioactive constituents.

Engineered Controls – Systems such as landfill covers and lined disposal cells will be monitored to assure containment of any residual contamination. Operation of these systems will be spelled out in ER Project, post-closure documentation.

Engineered Units/Landfills – These are units with engineered controls, such as landfill covers, lined disposal cells, and monitoring systems. There are three sites in this category—the CWL, the CAMU, and the MWL.

Environment, Health, and Safety (ES&H) Handbook – Operating-level instructions for staff and management at SNL/NM involving protection of workers, the public, and the environment.

Environmental Management (EM) Department – The SNL/NM Department presently charged with most environmental monitoring and reporting.

Environmental Media – Soil, air, and water are examples of environmental media through which contaminants can find a pathway to human receptors or the environment.

Environmental Monitoring – Determining physical controls for stewardship sites and both site and regional environmental monitoring programs to help evaluate the safety of the community and the environment. The task group outlined a decision logic and uncertainty matrix approach to deciding what controls and monitoring are needed.

Environmental Protection Agency (EPA) – Federal agency charged with protection of human health and the environment.

Environmental Restoration (ER) – This function, again used in the public domain as a synonym for "cleanup," includes a range of activities such as stabilizing contaminated sites, treating groundwater, and excavating buried wastes.

Environmental Restoration (ER) Project – The group of SNL/NM organizations charged with the function of site "cleanup," including a range of activities such as stabilizing contaminated sites, treating groundwater, and excavating buried wastes.

ER Site-Specific Information – This category provides detailed information on each site that was characterized by the ER Project at SNL/NM. These data are summarized in Appendix J.

External Sandia Systems – For external audiences, work on SNL/NM's LTES web site, development of a searchable GIS database, and efforts to make the SHEARS imaged records system available to the public are under way. SNL/NM's LTES web site can presently be accessed at http://www.sandia.gov/ltscenter/.

Fault – A crack in the earth that shows that one portion of the land (on one side of the crack) has moved relative to the other.

Fracture – A crack in the earth or within a rock or section of rocks that shows no relative motion on either side.

Future Land Use Categories – Before regulators can approve a site for closure, a future land use must be assigned to it. Given a likely future use, the regulator can then evaluate the level of contamination remaining at a site and determine if closure and movement to LTES is appropriate. The most often-used land use categories for SNL/NM are:

> **Residential** – Suited for permanent residential use;
>
> **Industrial** – Suited for an active industrial facility; and
>
> **Recreational** – Unfenced areas where daytime uses like hiking, biking, sports, or hunting and some overnight camping are allowed.

Future Use Logistics and Support Working Group – A group of federal agency representatives and stakeholders formed in 1994 to address future use designations across the KFC. The working group developed handbooks of information used to work with citizen groups for development of future land use recommendations for the entire base.

General Inorganics – Chemical compounds not derived from living agents that are a key component of SNL/NM water quality analyses.

Geographic Information System (GIS) – A special type of system that uses location, such as an X,Y coordinate or latitude and longitude, to identify information.

Governmental Controls – Those controls that are place upon property under DOE custody and controls that restrict use of land, facilities, and environmental media in order to prevent access to residual contamination. Governmental controls remain subject to the requirements of Federal Property Management Regulations for inventorying, surveys and inspection (Title 41 CFR, Subtitle C, Chapter 101).

Groundwater Monitoring – Periodic collection of groundwater samples for laboratory analyses to determine changes in chemical composition that may indicate contamination from a surface

or subsurface source. Also periodic measurement of groundwater levels to determine groundwater volume changes and changes in flow direction.

Groundwater Protection Program (GWPP) – This program places its focus on regional groundwater quality and characterization of groundwater flow. The program aims to evaluate impact on groundwater quality by SNL/NM operations. The KFC-wide GWPP includes the following:

- Monthly water level measurements in 126 wells, and
- Annual water quality measurements in 14 wells and one spring, analyzed for VOCs, TOX, phenols, general inorganics, and metals.

Groundwater Restrictions – Specific classification systems used to protect the quality of or use of groundwater. These systems operate through a state well permitting system. Under them, criteria may be established that must be met before a use permit or construction is allowed.

Groundwater Units – These are areas of concern for contamination or potential contamination of aquifers. They are not directly tied to surface ER sites. SNL/NM has five such units.

Hazardous and Solid Waste Amendments (HSWA) – Amendments to RCRA.

Hydrological – Properties having to do with the science that studies the distribution of water in the atmosphere, on the earth's surface, and in the soil and rocks of the surface.

Installation Restoration Project – KAFB ER Project charged with the function of site remediation for USAF sites, including a range of activities such as stabilizing contaminated sites, treating groundwater, and excavating buried wastes.

Institutional Controls (ICs) – Nonengineering measures, usually but not always involving legal means, intended to prevent or reduce human exposure to hazardous substances at sites. Examples are land use designations, deed restrictions, building permits, and water use advisories. They are distinct from physical controls, such as signs, fences, landfill covers, or monitoring systems.

Internal Sandia Systems – Three products are currently in varying stages of development: an interactive mapping system, an electronic SWMU atlas, and a groundwater information tool.

- The interactive mapping system is a web-based, GIS tool that will allow SNL/NM users to access SWMU information at their desktop PC, without specialized software. This system will allow SNL/NM users in such groups as Real Estate, Facilities, EM, and Emergency Management to access and use SWMU information. This system will ultimately be used to access graphical information about SWMUs that will be part of the LTES program. A beta test version of this system will be completed by fall 2001.
- An electronic atlas of all SWMUs that have been removed from SNL/NM's NMED permit. This will allow the printing of site maps for individual sites. The atlas is expected by fall 2001.

Isleta Pueblo – Native American pueblo located directly south of KFC and, thus, a neighbor to SNL/NM activities on the base and a stakeholder.

Kirtland Federal Complex (**KFC)** – The area encompassed by KFC and lands withdrawn from public use by either DOE or DOD from the USFS.

Long-term Environmental Stewardship (LTES) – a broad term describing the long-term activities that will be conducted on a site after closure. These include operation and maintenance of engineered barriers, monitoring, access restrictions, security, government controls, land-use controls, information management, and the needed funding to support these activities.

LTES IMS Maintenance and Administration – This information would describe the actual operations of the LTES IMS and provide feedback on how the system's data are being used and how the system might be improved in the future.

Management – Managing the operation of stewardship activities from the view-point of both stewards and stake holders. Among the topics this group addressed were—how an LTES program should be administered, how funding should be determined, and how community outreach should be continued.

Manhattan Project – Historical World War II project to build the first atomic weapons. Centered at Los Alamos, New Mexico, the project's Z Division was located at Sandia Base in Albuquerque, which subsequently became SNL/NM.

Metals – Metallic elements that are a component of SNL/NM water quality analyses.

Meteorological – Having to do with weather, in terms of precipitation, wind speeds and direction, and larger patterns that may help determine a likely dissemination pathway for an airborne contaminant.

Meteorological Monitoring Program – This program includes a KFC-wide network of eight meteorological towers. The resulting data support modeling efforts for other air quality programs at SNL/NM and emergency management activities. The towers continuously collect data, with the computer information link updated every 15 minutes.

Mixed Waste Landfill (MWL) – The MWL is a 2.6-acre site about five miles south of the Albuquerque Sunport on KFC. From 1959 to 1988, it was a disposal area for low-level radioactive and "mixed" wastes. (Mixed wastes have both hazardous and radioactive components.) An estimated 100,000 cubic feet of low-level radioactive and mixed wastes were disposed of at the landfill in unlined pits and trenches.

Monitoring Data – This category of information pertains to any required LTM at the sites and includes the types of monitoring and the actual data.

New Mexico Environment Department (NMED) – The agency with regulatory authority for SWMUs at SNL/NM.

No Further Action (NFA) – A term used to describe environmental sites where regulators have confirmed that no further clean-up remedy is required.

No Site Control Required Units – Levels of contamination remaining at these sites, if any, are so low as to pass even residential land-use criteria. However, current land-use scenarios for these 135 sites are either industrial or recreational.

Passive Institutional Controls (ICs) – are defined by their dependence on the design of controls and structures to preserve knowledge about the location, design, and contents. Examples are:

- Permanent markers placed at a disposal site;
- Public records and archives;
- Government ownership; and
- Regulations regarding land or resource use.

Pathway – a route for a chemical or radioactive contaminant to take to a receptor; i.e., a human, a plant, or an animal that may be affected through contaminant exposure, contact, or ingestion.

Phenols – A chemical compound used in resins, plastics, pharmaceuticals, and disinfectants and a component of SNL/NM water quality analyses.

Physical Controls – are barriers to access. Fences, berms, and locked gates are all examples of physical controls.

Property Controls – Those controls that are implemented through property ownership documentation and are based on the retention of property rights by DOE. Property controls include: covenants, easements, zoning, use restrictions, water right restrictions, digging/drilling restrictions, access restrictions, any related types of controls, and all enforcement mechanisms. Property controls remain subject to the requirements of Federal Property Management Regulations for inventorying, surveys and inspection (Title 41 *Code of Federal Regulations*, Subtitle C, Chapter 101).

Proprietary/Governmental Controls – This classification of ICs is based upon the legal authority of landowners to control use of their land. Proprietary controls, such as easements, are based upon the rights associated with ownership of an interest in land. Government controls rely on the powers of governments to protect the public health and safety either through zoning, legislation, land ownership, or permit programs.

Public Outreach Information – Information in this category would be used to determine how public outreach is conducted and to determine if these efforts meet public needs.

Receptor – A human, a plant, or an animal that could be expose to a contaminant.

Relational Database Management System – A database management system with the ability to access data organized in tabular files that can be related to each other by a common field. It has the capability to recombine the data items from different fields, providing powerful tools for data usage.

Resource Conservation and Recovery Act (RCRA) – Basis of most of the regulations governing ER Project cleanups at SNL/NM.

Safety, Health and Environmental Automated Records System (SHEARS) – A software application used to index site records after closure. At present, this on-line, web-based system is available to SNL/NM employees and contractors but not the public.

Security Controls – These include on-site patrols and security gates. While these will be maintained by SNL/NM's security organization, a close information tie will be maintained between security requirements, land ownership information, and environmental knowledge about a given site.

Signed Units – Most of the 65 sites in this group have been granted "closure" status by the regulator. Some have residual contamination above background levels, but meet levels for industrial or recreational future land-use designations. Because some risk persists, some level of environmental monitoring is planned at these sites.

Signed and Fenced Units – These sites have mainly physical hazards, such as mineshafts or pits, although a few in this group contain sufficient levels of residual contamination to warrant LTM. There are 14 sites in this category.

Site Closure Index – All SWMU records at closure are indexed and included in the SHEARS database. The records and index are imaged for long-term, on-line availability.

Site Environmental Monitoring Program (SEM) – Program designed to provide early detection of any contaminant release, help identify the source of contamination, and verify compliance of monitoring to regulations across all SNL/NM sites.

Siting Restrictions – Control land use in areas subject to natural hazards, such as earthquakes, fires, or floods. Such restrictions are created through statutory authority to require that states implement and enforce certain land use controls as well as through local ordinances.

Soil Moisture – The amount of water contained in soil and usually expressed as a percentage of the soil's weight.

Soil Types – A description of the various components of a soil to help determine its compactness and other properties that reveal its potential in spreading or containing contaminants.

Solid Waste Management Unit (SWMU) – This legal term was developed under federal legislation to ensure remediation activities at environmental sites. Often, "SWMU" is a synonym for an ER site; however, it also can be used to designate a number of sites with some common theme. There are two types of SWMUs relevant to the SNL/NM cleanup:

> **Conditional Release Sites** – If a SWMU has residual contamination above regulatory levels of concern, it may be appropriate for some land uses, but not for all. Just as there is a broad range of residual contamination possibilities, there is a range of possible uses. Approval for these uses would be determined using risk-based criteria with concurrence of the regulators.

Unlimited Release Sites – If no contamination was discovered during the investigation process or if site clean-up efforts reduced the level of residual contamination to below levels of regulatory concern, sites may be released unconditionally. Sites approved for such a release would still require administrative stewardship actions. Information on the site investigation, cleanup, and final status must be maintained in a way that connects it with the site for the benefit of future users.

Stakeholder – Those citizen groups and organizations expected to have a role in LTES.

Steward – The agency responsible for LTES activities. At SNL/NM sites the steward is the DOE and any successor organizations. This role is sometimes described as the "principal" steward. The "implementation" steward, or the entity responsible for actual stewardship operations, is SNL/NM or any successor organization(s).

Surface Water and Stormwater Monitoring – Contaminants present at the surface could be transported by surface-water runoff from a site and subsequently deposited elsewhere on soil, sediments, or vegetation, or carried to a surface-water body. Waterborne contaminants may present a human exposure pathway through ingestion of contaminated water or by ingestion of contaminated soil or food. In the case of radioactive material, receptors may receive external exposure to contamination deposited by surface waters.

Surface-Water Runoff – Water from rainfall or snow or human activity that may run along the surface of a site and provide a transport mechanism for spreading contamination.

Task Groups – The following task groups of volunteers from the public and other stakeholder groups contributed to this plan: LTES Management, SEM, and ICs, and Information Management. More information on their contributions and backgrounds can be find in the appendices.

Terrestrial Surveillance Program – In this program, soil, sediment, and vegetation sampling is conducted annually at 39 on-site, 17 perimeter, and 16 off-site locations. The samples—including soil (49), sediment (10), and vegetation (29) samples—are analyzed for metals and radioactive constituents. A program to measure "ambient" existing radiation levels at 34 locations uses TLDs to take measurements. Data from this program are used to perform trending and other statistical analyses to compare on-site and perimeter results with those from off-site locations.

Thermoluminescent Dosimeter (TLD) – A passive measuring device using a crystal to track exposure to ambient radiation levels.

Topographical – The property having to do with the relative flatness, slope, or contour of an area.

Total Organic Halogens (TOX) – A measurement of total amounts of five chemically-related non-metallic chemicals found in a water quality analysis process.

Uncertainty Matrix – Potential failures of barriers and contingencies for such failures can be organized and characterized for any site with this management tool.

Unlimited Release Sites – If no contamination was discovered during the investigation process or if site clean-up efforts reduced the level of residual contamination to below levels of regulatory concern, sites may be released unconditionally. Sites approved for such a release would still require administrative stewardship actions.

Vadose Zone – The vadose zone is the unsaturated zone above the water table (from the surface to the saturated zone). Vadose zone monitoring will primarily consist of near surface measurements of soil moisture and soil gas at engineered closure sites. Any changes in soil moisture or soil gases within an engineered system may indicate a potential mechanism for contaminants to become mobile.

Vadose Zone Monitoring – The vadose zone is the unsaturated zone above the water table (from the surface to the saturated zone). Vadose zone monitoring will primarily consist of near-surface measurements of soil moisture and soil gas at engineered closure sites. Any changes in soil moisture or soil gases within an engineered system may indicate a potential mechanism for contaminants to become mobile.

Volatile Organic Compound (VOC) – An easily evaporated chemical compounds used for cleaning solvents and other activities including some fuels. This is one of the components analyzed for in SNL/NM water quality testing.

Zoning – Use restrictions imposed through the local zoning or land use planning authority. Such restrictions can limit access and prohibit disturbance of the remedy. Zoning authority does not exist in every jurisdiction.

9.0 REFERENCES

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2. "Overview of Statutory and Regulatory Requirements for Long-Term Stewardship at DOE Sites," updated January, 2001. Website: http://lts.apps.em.doe.gov.

3. "Long-Term Stewardship Study (draft)," U.S. Department of Energy, Office of Environmental Management, Office of Long-Term Stewardship, October 2000.

4. "Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups." EPA Office of Solid Waste and Emergency Response (OSWER) 9355.074FS-P, EPA 540-F-00-005, September 2000.

5. "Institutional Controls: What they are and how they are used." BRAC Environmental Program Fact Sheet, Spring 1997. Office of the Deputy Under Secretary of Defense (Environmental Security).

6. "Handbook: Baseline for Future Use Options" June 1995; "Workbook: Future Use management Area 2" September 1995; "Workbook: Future Use Management Area 1, Sector P The Withdrawn Area" October 1995; "Workbook: Future Use Management Areas 3,4,5, and 6" January 1996; "Workbook: Future Use Management Area 7" March 1996; all prepared by Keystone Environmental and Planning for the Future Use Logistics and Support Working Group in cooperation with Department of Energy Affiliates, the U.S. Air Force and the U.S. Forest Service.

7. "Sandia National Laboratories, Sites Comprehensive Plan FY2001 to FY2010" SAND 2001-0034P. Website: http://www.sandia.gov/scp/

8. Andrew Duran, DOE Headquarters Real Estate section, personal communication with the author.

9. "FY 2000 National Defense Authorization Act Long-term Stewardship Report, Report to Congress on Long-Term Stewardship," Release No. R-01-025, Release Date: January 19, 2001. Website: http://lts.apps.em.doe.gov/center/reports/jan01rtc.html

10. "The Role of Local Governments in Long-Term Stewardship at DOE Facilities," Environmental Law Institute (ELI).

11. "The Oak Ridge Reservation Stakeholder Report on Stewardship." Oak Ridge End Use Working Group, July 1998. To receive a copy, call the Oak Ridge Information Resource Center, (423) 241-4582.

12. Revised Public Participation Policy Guidance "Public Participation and Community Relations," U.S. DOE, T.J. Glauthier, January 19, 2001.

13. “Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites,” 2000, National Academy of Science, National Academy Press, Washington, D.C. Website: http://www.nap.edu/books/0309071860/html/

APPENDIX A
SNL/NM ER Site Characteristics for Stewardship
June 2001

Table A-1. SNL/NM ER Site Characteristics for Stewardship

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
Engineered Units/Landfills—Criteria: Sites will have some type of engineering done as a remedy																
74	1267	Chemical Waste Landfill	III	1.90	5,421	505	VOCs, Metals	DOE Owned		Industrial	Yes			This site will be fenced.	Yes	This site is an RMMA.
76	1289	Mixed Waste Landfill	III	5.00	5,381	470	H-3	DOE Owned		Industrial	Yes			This site will be fenced, This site will also have long term ground water monitoring, this site will be capped.	Yes	This site is an RMMA.
107		Corrective Action Management Unit	III	22.73	5,407	475	DU, HE, Heavy metals	DOE Owned		Industrial	Yes			This site is fenced.	Yes	Containment cell.
Signed and Fenced Units—Criteria: 1. Physical hazard at the site; 2. Potential for future erosion; 3. Mineshafts																
1	1303	Radioactive Waste Landfill & Chemical Disposal Pits	II	0.30	5,421	520		DOE Owned		Industrial	Yes		VCM/ Confirmatory Sampling/Risk-Based (September 1997)		None	This site is an RMMA.
28	1332	Mine Shafts, Mine & Spoil Pile 28-1		0.11	6,200	40–80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.
28B	1332	Mine Shafts, 28-2, MS-B, 2 Shafts		0.04	6,570	40–80	Metals, HE	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.
28C	1332	Mine Shafts, 28-3, MS-C		0.02	6,342	40–80	None	USFS Withdrawal	None	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28D	1332	Mine Shafts, RW-50, 28-4, MS-D		0.30	6,273	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28E	1332	Mine Shafts, MS-E, 28-5		0.02	6,430	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28F	1332	Mine Shafts, MS-F, 28-6		0.02	6,213	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
28G	1332	Mine Shafts, MS-G, 28-7		0.02	6,238	40–80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28H	1332	Mine Shafts, 28-8, MS-H		0.02	6,243	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28I	1332	Mine Shafts, 28-9, MS-I		0.02	7,310	40–80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28J	1332	Mine Shafts, 28-10, MS-J		0.15	6,201	40–80	Metals	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.
55	1335	Red Towers Site (Thunder Range)		13.26	5,405	300	DU	KAFB	None	Industrial		Approved 9/30/99			Soil Disturbance Restrictions	This site is an RMMA.
87	1332	Bldg. 9990 Firing Site		97.46	6,140	350	Metals, DU, HE	USFS Withdrawal	40	Recreational					Soil Disturbance Restrictions	This site is an RMMA. This is also an active site.
Signed Units—Criteria: 1. Risk-based NFA; 2. Residual contamination greater than background; incremental human health and ecological risk greater than residential land-use scenario, but less than industrial land-use scenario.																
91	1335	Lead Firing Site (Thunder Range)		21.19	5,411	300	Pb	USAF Permitted to DOE	28	Industrial					Soil Disturbance Restrictions	This site is an RMMA.
8	1332	Open Dump (Coyote Canyon Blast Area)		30.10	5,920	150	Metals, DU, HE, Asbestos, JP-4, Th, H-3	USAF Permitted to DOE	17A	Industrial						This site is an RMMA. Not remediated yet.
10	1333	Burial Mounds (Bunker Area North of Pendulum Site)		2.86	6,175	180	None	KAFB	None	Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.
11	1334	Explosive Burial Mounds		1.01	5,720	88	Metals, SVOCs	KAFB	None	Industrial		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
12A	1333	Burial Site/Open Dump: Open Dump (Lurance Canyon)		0.26	6,358	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/7/99	Confirmatory Sampling (May 1997)	None	None	This site is an RMMA.
12B	1333	Burial Site/Open Dump: Buried Debris in Graded Area		0.35	6,340	130	Metals, HE, VOCs, SVOCs	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.
16	1309	Open Dumps (Arroyo del Coyote)		25.36	5,540	500	None	KAFB	None	Recreational		Approved 3/27/2000		None	None	This site is an RMMA.
17A	1335	Scrap Yards/Open Dump (Thunder Range)		0.42	5,419	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17B	1335	Scrap Yard/Open Dump (Thunder Range)		2.11	5,409	167	DU, Pb	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17C	1335	Scrap Yard/Open Dump (Thunder Range)		8.04	5,502	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17D	1335	Scrap Yard/Open Dump (Thunder Range)		0.32	5,476	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17E	1335	Scrap Yard/Open Dump (Thunder Range)		0.06	5,417	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17F	1335	Scrap Yard/Open Dump (Thunder Range)		0.02	5,417	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17G	1335	Scrap Yard/Open Dump (Thunder Range)		0.67	5,467	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17H	1335	Scrap Yard/Open Dump (Thunder Range)		1.86	5,427	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
18	1306	Concrete Pad	III, V	1.13	5,387	470	DU, HE, PBCs, Metals (Cd, Cr, Zn, others)	DOE Owned		Industrial			VCM/Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
19	1332	TRUPAK Boneyard Storage Area (Northwest end of Old Aerial Cable)		1.85	6,150	400	Radionuclides, Metals	KAFB	None	Recreational	Yes	Approved 6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	This site is fenced.	None	This site is an RMMA.
21	1334	Metal Scrap (Coyote Springs)		0.98	5,849	15	None	KAFB	None	Industrial		Approved 3/18/99 & 12/6/99	Administrative (August 1994); Confirmatory Sampling/Risk-Based (September 1997)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
27	1332	Bldg 9820 - Animal Disposal Pit (Coyote Springs)		0.57	6,040	160–200	Radionuclides, VOCs, SVOCs, Metals, Pesticides, Herbicides, HE	USAF Withdrawn from USFS Permitted to DOE	106A	Recreational		Approved 6/99	Confirmatory Sampling (August 1995); VCM/Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA.
44A	1303	Decontamination Site & Uranium Calibration Pits	II	0.01	5,414	520	Radionuclides (especially U), Metals	DOE Owned		Industrial		Approved 12/6/99	Confirmatory Sampling (August 1994); VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
44B	1303	Decontamination Site & Uranium Calibration Pits	II	0.03	5,415	520	Radionuclides (especially U), Metals	DOE Owned		Industrial		Approved 12/6/99	Confirmatory Sampling (August 1994); VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
45	1309	Liquid Discharge	IV	0.78	5,406	350	Metals	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions	
57A	1334	Workman Site: Firing Site		4.22	5,706	88	Metals, SVOCs, HE, PCBs	KAFB		Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	
57B	1334	Workman Site: Target Area		11.12	5,952	125–220	Metals	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions	
58	1332	Coyote Canyon Blast Area		254.60	5,940	150	HE, Metals, Organics, Argon, Radionuclides	KAFB	17A	Industrial, part Recreational						This site is an RMMA.
59	1333	Pendulum Site		0.20	6,129	180	None	KAFB	None	Industrial		Approved 6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)	None	None	
61A	1334	Schoolhouse Mesa Test Site		33.93	5,876	95	Metals, HE, SVOCs, VOCs, Radionuclides	KAFB	None	Industrial		Approved (uncertain date)	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	Soil disturbance restrictions	This site is an RMMA.
61B	Archival	Schoolhouse Mesa Test Site: Cratering Area		41.80	5,716	50	This site was given back to KAFB in May 1995	KAFB	None	Industrial		Transferred to KAFB		None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
61C	1334	Schoolhouse Mesa Test Site: Schoolhouse Bldg		4.49	5,798	95	Metals, VOCs, SVOCs, HE	KAFB/USAF Permitted to DOE	27B	Industrial		Approved 9/30/99		None	Soil Disturbance Restrictions	This site is an RMMA.
63A	1333	Balloon Test Area: PDSP Site		4.08	6,165	150	None	USAF Withdrawn from USFS Permitted to DOE, DOE Withdrawn from USFS	42, 61	Recreational		Approved 12/6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)	None	None	This site is an RMMA.
63B	1333	Balloon Test Area: Balloon/Helicopter Site		9.25	6,173	200	None	USAF Withdrawn from USFS Permitted to DOE, DOE Withdrawn from USFS	42, 61, 105	Recreational		Approved 6/99	Confirmatory Sampling (September 1997)	None	None	This site is an RMMA.
64	1333	Gun Site (Madera Canyon)		1.61	6,500	150	None	DOE Withdrawn from USFS	6A	Recreational		Approved 12/6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)			
65A	1333	Lurance Canyon Explosive Test Site: Small Debris Mound		0.02	6,363	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000		None	None	This site is an RMMA.
65B	1333	Lurance Canyon Explosive Test Site: Primary Detonation Area		3.39	6,348	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000				This site is an RMMA.
65C	1333	Lurance Canyon Explosive Test Site: Secondary Detonation Area		1.33	6,355	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000				This site is an RMMA.
65D	1333	Lurance Canyon Explosive Test Site: Near Field Dispersion Area		7.98	6,325	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 9/30/99				This site is an RMMA.
65E	1333	Lurance Canyon Explosive Test Site: Far Field Dispersion Area		76.85	6,365	130	DU	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
68	1334	Old Burn Site		6.48	5,862	115–125	Metals, VOCs, SVOCs, Radionuclides	KAFB	None	Industrial						This site is an RMMA.
70	1334	Explosives Test Pit (Water Towers)		0.23	5,730	73	Metals	USAF Permitted to DOE	23	Industrial		Approved 12/6/99	Confirmatory Sampling/Risk-Based (September 1997)	None	None	
71	1334	Moonlight Shot Area		83.11	5,864	115–125	DU, Metals	KAFB	None	Industrial		Approved 12/13/99 & 3/18/99	Administrative (August 1994); Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.
81C	1333	New Aerial Cable Site: Former Burial Location		0.12	6,445	150	Metals, HE, SVOCs, VOCs	USAF Withdrawn from USFS Permitted to DOE	32	Recreational		Approved 9/30/99		None	None	
85	1335	Firing Site (Bldg. 9920)		0.94	5,454	347	DU, Metals (Be, Li, Pb), HE, Cadmium sulfide, Manganese dioxide	USAF Permitted to DOE	24	Industrial		Approved 12/31/99	Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA. This site is an active site.
88B	1334	Firing Site: Instrumentation Pole		15.34	5,816	50	Metals, HE	KAFB	None	Industrial		Approved 12/6/99	Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
89A	1335	Shock Tube Site (Thunder Range)		0.78	5,416	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
89B	1335	Shock Tube Site (Thunder Range)		0.72	5,423	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
89C	1335	Shock Tube Site (Thunder Range)		1.84	5,422	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
94A	1333	Lurance Canyon Burn Site: Above-Ground Tanks		0.75	6,370	150	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational			Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA. This site is an active site.
94B	1333	Lurance Canyon Burn Site: Debris/Soil Mound Area		0.57	6,330	130	VOCs, SVOCs, HE, Metals, Radionuclides	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
94C	1333	Lurance Canyon Burn Site: Bomb Burner Area and Discharge Line		0.24	6,343	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.
94D	1333	Lurance Canyon Burn Site: Bomb Burner Discharge Pit		0.02	6,333	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 9/30/99		None	None	This site is an RMMA.
94E	1333	Lurance Canyon Burn Site: Small Surface Impoundment		0.17	6,338	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approve 3/27/2000		None	None	This site is an RMMA.
94F	1333	Lurance Canyon Burn Site: LAARC Discharge Pit		0.03	6,348	130	JP-4, VOCs, SVOCs, HE, Metals, Radionuclides	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.
94G	1333	Lurance Canyon Burn Site: Scrap Yard		3.23	6,345	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational				None	None	This site is an RMMA. This site is an active site.
96	1302	Storm Drain System	I	24.00	5,420	300	Radionuclides, Metals, PCBs, Organics, Inorganics	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (May 1997)	None	None	
103	1335	Scrap Yard (Bldg. 9939)		3.34	5,612	290–330	Pb, DU	USAF Permitted to DOE	170	Industrial		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active site.
108	1335	Firing Site (Bldg. 9940)		0.39	5,530	530	DU, HE, Cr	USAF Permitted to DOE	17B, 25	Industrial		Approved 6/99	Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active site.
109	1335	Firing Site (Bldg. 9956)		0.27	5,486	530	None	USAF Permitted to DOE	26	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
154	1295	Bldg. 9960 Septic Systems		0.15	5,588	635	HE, Metals, Phenols	USAF Permitted to DOE	22	Industrial			Confirmatory Sampling/Risk-Based (August 1997)	None	None	More information coming.
187	1302	TA-I Sanitary Sewer Lines	I	24.00	5,420	300	Radionuclides, Metals, VOCs, SVOCs, PCBs	DOE Owned		Industrial		Additional Information Requested (3/17/98)	Confirmatory Sampling/Risk-Based (May 1997)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
193	1335	Sabotage Test Area		0.63	5,470	350	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
226	1302	Old Acid Waste Line	I	1.42	5,413	300	Metals, VOCs, SVOCs, PCBs, Radionuclides	DOE Owned		Industrial		Additional Information Requested (3/17/98)	Confirmatory Sampling/Risk-Based (May 1997)	None	None	
228A	1309	Centrifuge Dump Site	IV	1.58	5,540	280	None	DOE Owned		Industrial		Approved 3/00		None	None	This site is an RMMA.
228B	1309	Centrifuge Dump Site	IV	6.55	5,540	545	None	DOE Owned		Industrial				None	None	This site is an RMMA.
232	1309	Storm Drain System Outfall	IV	0.03	5,338	440	Petroleum hydrocarbons	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (August 1997)	None	None	
275	1306	TA-V Seepage Pits	III, V	0.28	5,433	491	Metals, VOCs, SVOCs,	DOE Owned		Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	
No Site Control Required (Informational Stewardship)—Criteria: 1. Future use is established as industrial or recreational; 2. Passes residential risk criteria; or, 3. All constituents are below background																
2	1303	Classified Waste Landfill	II	1.93	5,418		Radionuclides, Metals, PCBs, HE, VOCs	DOE Owned		Industrial					None	This site is an RMMA. This site will be completely remediated.
4	1307	LWDS Surface Impoundments	III, V	0.84	5,410		Radionuclides, Organics, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1995)	None	Digging Restrictions	This site is an RMMA.
5	1307	LWDS Drainfield	III, V	0.11	5,430		Radionuclides, Organics, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1995)	None	None	This site is an RMMA.
6A	1335	Gas Cylinder Disposal Pit		1.37	5,402		None	KAFB	None	Industrial			VCM/Confirmatory Sampling (October 1996)	None	None	
6	1335	Gas Cylinder Disposal Pit (Bldg. 9966)		0.03	5,402		None	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (October 1996)	None	None	
7	1309	Gas Cylinder Disposal (Arroyo del Coyote)		7.03	5,466	500	None	KAFB	None	Recreational	Yes	Approved 3/27/00	Administrative (June 1995)	This site is fenced.	None	
9	1334	Burial Site/Open Dump (Schoolhouse Mesa)		1.86	5,848		DU, HE, Metals, SVOCs	KAFB	None	Industrial				None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
13	1333	Oil Surface Impoundment (Lurance Canyon Burn Site)		0.49	6,348	120	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site will have long term monitoring of the groundwater.
14	1335	Burial Site (Bldg. 9920)		1.25	5,454	347	None	USAF Permitted to DOE	24	Industrial		Approved 6/99	Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active Site.
15	1332	Trash Pits (Frustration Site)		2.44	6,275		None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved 9/97	Confirmatory Sampling (August 1995)	None	None	
20	Archival	Schoolhouse Mesa Burn Site		0.16	5,802		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	This site is an RMMA.
22	1334	Storage/Burn (west of SOR)		0.07	5,890	55	None	KAFB	None	Industrial		Approved 10/13/99	Confirmatory Sampling (June 1995)	None	None	
23	1309	Disposal Trenches (near Tijeras Arroyo)		16.10	5,336	290	None	KAFB	None	Industrial		Approved 10/13/99	Administrative (June 1995)	None	None	This site is an RMMA.
26	1306	Burial Site (west of TA-III)	III, V	167.12	5,328		Metals, DU	DOE Owned		Industrial			Administrative (June 1996)	None	None	Wholly contained within ER Site 83, which is an active site.
30	1302	PCB Spill (Reclamation Yard)	I	6.58	5,428	300	PCBs, Organics, Metals	DOE Owned		Industrial				None	Yes	This site will need to be monitored for compliance with the "PCB Mega Rule."
31	1306	Electrical Transformer Oil Spill	III, V	0.01	5,415		PCBs, Mineral based transformer oil	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
32	Archival	Steam Plant Oil Spill	I	0.22	5,405	275	Petroleum hydrocarbons	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
33	1302	Motor Pool Oil Spill	I	2.32	5,429	275	Petroleum hydrocarbons, Organic solvents, Metals	DOE Owned		Industrial			Confirmatory Sampling (October 1996)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
34	1306	Centrifuge Oil Spill	III, V	0.16	5,433		Mineral based transformer oil, PCBs	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
35	1306	Vibration Facility Oil Spill	III, V	0.02	5,404		Oil, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
36	1306	Oil Spill - HERMES	III, V	0.05	5,436		Oil, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
37	1306	PROTO Oil Spill	III, V	0.55	5,439		Mineral based transformer oil	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
38	1335	Oil Spills (Bldg. 9920)		0.01	5,459	496	None	USAF Permitted to DOE	28	Industrial		Approved 12/17/99	Confirmatory Sampling (June 1996)	None	None	
39	1335	Oil Spill - Solar Facility		0.02	5,587		None	USAF Permitted to DOE	92	Industrial		Approved 9/97	Administrative (June 1995)	None	None	
40	1309	Oil Spill (6000 Igloo Area)		0.02	5,230	400	None	KAFB	35	Industrial	Yes	Approved 9/97	Confirmatory Sampling (June 1995)	This site is fenced.	None	
41	Archival	Bldg. 838 Mercury Spill	I	0.14	5,414	275	Hg	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
42	1302	Acid Spill Water Treatment Facility	I	0.46	5,430	300	Acids, Bases, Metals	DOE Owned		Industrial		Approved 12/7/99	Confirmatory Sampling/Risk-Based (May 1997)	None	None	
43	1303	Radioactive Material Storage Yard	II	0.11	5,410	300	Metals, Radionuclides	DOE Owned		Industrial		Approved 12/20/99	Administrative (August 1994)	None	None	This site is an RMMA.
46	1309	Old Acid Waste Line Outfall (Tijeras Arroyo)	IV	1.16	5,383	490	VOCs, SVOCs, PCBs, Metals, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
47	Archival	Unmanned Seismic Observatory		1.02	5,980		None	USFS Withdrawal	None	Recreational		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
48	1303	Bldg. 904 Septic System	II	0.46	5,410		Organics, HE, Radionuclides, Inorganics, Metals	DOE Owned		Industrial			Confirmatory sampling (June 1995)	None	None	This site is an RMMA.
49	1295	Bldg. 9820 Drains		0.04	6,045		VOCs, SVOCs	USAF Withdrawn from USFS Permitted to DOE	106A	Recreational			Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
50	1309	Old Centrifuge Site (Tijeras Arroyo)	IV	0.39	5,405	320	None	DOE Owned		Industrial		Approved 3/27/00	Risk-Based (June 1995)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
51	1306	Bldg. 6924 Pad, Tank, Pit	III, V	0.15	5,416		VOCs, SVOCs, Metals, HE, Radionuclides	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
52	1307	LWDS Holding Tanks	III, V	0.58	5,420		VOCs, SVOCs, Radionuclides, Metals	DOE Owned		Industrial			Confirmatory Sampling (September 1995)	None	None	This site is an RMMA.
53	1335	Bldg. 9923 Storage Igloo		0.00	5,459		Radionuclides, Organic solvents, Heavy metals	USAF Permitted to DOE	24	Industrial		Approved 9/97	Administrative (June 1995)	None	None	
54	1335	Pickax Site (Thunder Range)		445.69	5,358	480	HE	KAFB	None	Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
56	1335	Old Thunderwells (Thunder Range)		0.08	5,415	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
60	1333	Bunker Area (north of Pendulum Site)		0.01	6,181		DU, Metals	KAFB	None	Industrial				None	None	This site is an RMMA.
62	Archival	Greystone Manor Site		6.43	5,854		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
66	1332	Boxcar Site		3.91	5,980		Metals, VOCS	USFS Withdrawal	None	Recreational			Confirmatory Sampling (October 1996)	None	None	This site is an RMMA.
67	1332	Frustration Site		0.01	6,350		None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Administrative (August 1995)	Barriers to entry	None	This site is also a Mine Shaft.
69	Archival	Old Borrow Pit		0.97	5,952		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
72	1333	Operation Beaver Site		0.41	7,855	300	None	USFS Withdrawal	None	Recreational		Approved 10/13/99??	Administrative (June 1995); Confirmatory Sampling (October 1996);	None	None	
73	Archival	Bldg. 895 Hazardous Waste Repackaging/Storage	I	0.36	5,418	300	RCRA Chemicals	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
77	1309	Oil Surface Impoundment (Tijeras Arroyo)	IV	0.17	5,388	490	None	DOE Owned		Industrial		Approved 10/13/99	Confirmatory Sampling (June 1995)	None	None	
78	1306	Gas Cylinder Disposal Pit	III, V	0.46	5,427		Toxic, Corrosive, Reactive and flammable gases, Radionuclides, Metals, HE	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	
81A	1333	New Aerial Cable Site: Catcher Box/Sled Track		2.39	6,465	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81B	1333	New Aerial Cable Site: Impact Pad		4.07	6,393	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81D	1333	New Aerial Cable Site: Northern Cable Area		4.28	6,345	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81E	1333	New Aerial Cable Site: Gun Impact Area		0.11	6,433	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						
81F	1333	New Aerial Cable Site: Scrap Yard		1.29	6,435	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
82	1332	Old Aerial Cable Site Scrap		22.02	6,230		DU, Metals, HE	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational						This site is an RMMA. This site is an active site.
83	1306	Long Sled Track	III, V	233.35	5,335		Metals, HE, Radionuclides, DU	DOE Owned		Industrial						This site is an RMMA. This site is an active site.
84	1306	Gun Facilities	III, V	1.41	5,351		Metals, HE, Radionuclides	DOE Owned		Industrial						This site is an RMMA. This site is an active site.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
86	1335	Firing Site (Bldg. 9927)		1.60	5,470		DU, Be, Pb, HE	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
88A	Archival	Firing Site: Ranchhouse		1.14	5,814		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
90	1335	Beryllium Firing Site (Thunder Range)		0.34	5,474	300	None	USAF Permitted to DOE	28	Industrial		Approved 12/14/99	Confirmatory Sampling (January 1997)	None		This site is an RMMA.
92	1333	Pressure Vessel Test Site (Coyote Canyon Blast Area)		6.12	6,000		None	USAF Permitted to DOE	17A	Industrial		Approved NFA/Off HSWA Permit 9/97	Administrative (August 1995)	None	None	
93A	1333	Madera Canyon Rocket Launcher Pad A		0.08	6,378	300	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99??	Administrative (June 1995); Confirmatory Sampling (October 1996)	None	None	
93B	1333	Madera Canyon Rocket Launcher Pad B		0.16	6,170	200	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99??	Administrative (June 1995); Confirmatory Sampling (October 1996)	None	None	
93C	1333	Madera Canyon Rocket Launcher Pad C		0.17	6,205	200	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99??	Administrative (June 1995): Confirmatory Sampling (October 1996)	None	None	
98	1302	Bldg. 863 TCA Photochemical Releases	I	0.37	5,419	300	VOCs, Acids, Bases, Ag	DOE Owned		Industrial						
100	1306	Bldg. 6620 HE Sump/Drain	III, V	0.05	5,424		HE	DOE Owned		Industrial			Administrative (June 1996)	None	None	
101	1295	Explosive Contaminated Sumps, Drains (Bldg. 9926)		0.13	5,460		VOCs, SVOCs, Cn, Metals (Cr)	USAF Permitted to DOE	25	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
102	1306	Radioactive Disposal (east of TA-III)	III, V	155.54	5,476		Radionuclides	DOE Owned		Industrial		Approved 5/5/00	VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
104	Archival	PCB Spill, Computer Facility	I	0.02	5,423	300	PCBs	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/99	Administrative (August 1994)	None	None	
105	Archival	Mercury (Bldg. 6536)	III					DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
111	1306	Bldg. 6715 Sump/Drains	III, V	0.01	5,393		HE, Ag, VOCs, SVOCs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
112	1335	Explosive Contaminated Sump (Bldg. 9956)		0.00	5,483	300	None	USAF Permitted to DOE	26	Industrial		Approved 12/7/99	Confirmatory Sampling (May 1997)	None	None	This site is an RMMA. This site is an active site.
113	1303	Area II Firing Sites	II	0.34	5,424		HE, Metals	DOE Owned		Industrial			Confirmatory Sampling (August 1994); Confirmatory Sampling (June 1996);	None	None	
114	1303	Explosive Burn Pit	II	0.00	5,409		HE, TNT, RDX, HMX	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	
115	1335	Firing Site (Bldg. 9930)		6.13	5,546	300	None	USAF Permitted to DOE	18, 132, 170	Industrial		Approved 12/14/99	Confirmatory Sampling (January 1997)	None	None	This site is an RMMA. This site is an active site.
116	1295	Bldg. 9990 Septic System		0.06	6,107		VOCs, Cn	USAF Permitted to DOE	40	Recreational			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
117	1335	Trenches (Bldg. 9939)		2.73	5,690		DU, Sodium	USAF Permitted to DOE	170	Industrial				None		This site is an RMMA.
135	1303	Bldg. 906 Septic System	II	0.03	5,415		Metals, Radionuclides, VOCs, PCBs, HE	DOE Owned		Industrial			Confirmatory Sampling (August 1994)	None	None	This site is an RMMA.
136	1303	Bldg. 907 Septic System	II	0.47	5,420		HE, Cleaning solvents, Metals, Radionuclides	DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.
137	1295	Bldg. 6540/6542 Septic System	III, V	0.63	5,403		VOCs, Metals (Ag, Cr), SVOCs, Cn	DOE Owned		Industrial			VCM/Confirmatory Sampling/Risk-Based (January 1997)	None	None	This site is an RMMA.
138	1295	Bldg. 6630 Septic System	III, V	0.27	5,409		VOCs, SVOCs, Metals (Ag, Ni)	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996	None	Soil Disturbance Restrictions	This site is an RMMA.
139	Archival	Bldg. 9964 Septic System		0.03	5,474		None	USAF Permitted DOE	28	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	This site is an RMMA.
140	1295	Bldg. 9965 Septic System		0.08	5,487		VOCs, SVOCs, Metals (Se)	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
141	1295	Bldg. 9967 Septic System		0.01	5,502		VOCs, Metals (Se)	USAF Permitted to DOE	28	Industrial		Approved 6/9/2000	VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
142	1295	Bldg. 9970 Septic System		0.06	5,678	130	VOCs, SVOCs, Metals (Pb, Se)	USAF Permitted to DOE	10	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
143	1295	Bldg. 9972 Septic System		0.11	5,679	119	VOCs, Metals (Ag, Ba)	USAF Permitted to DOE	10	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
144	1295	Bldg. 9980 Septic System		0.40	5,574	111	VOCs, Metals (Pb), Radionuclides (U-234, U-238)	USAF Permitted to DOE	93	Industrial		Approved 12/7/99	VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
145	1295	Bldg. 9981/9982 Septic Systems		0.45	5,568	140	VOCs, SVOCs, Cn, Metals (Pb, Ba)	USAF Permitted to DOE	93	Industrial		Approved 12/7/99	VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
146	1295	Bldg. 9920 Drain System		0.03	5,459		VOCs	USAF Permitted to DOE	24	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
147	1295	Bldg. 9925 Septic Systems		0.92	5,701		VOCs, SVOCs, Metals (Pb, Ba)	USAF Permitted to DOE	27B	Industrial			VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
148	1295	Bldg. 9927 Septic System		0.05	5,473		VOCs, Metals, DU, SVOCs, Inorganics	USAF Permitted to DOE	28	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
149	1295	Bldg. 9930 Septic System		0.11	5,531		VOCs	USAF Permitted to DOE	18	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
150	1295	Bldg. 9939/9939A Septic Systems		0.15	5,615		VOCs	USAF Permitted to DOE	170	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
151	1295	Bldg. 9940 Septic System		0.13	5,524		VOCs, Metals (Ba)	USAF Permitted to DOE	17B, 25	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
152	1295	Bldg. 9950 Septic System		0.08	5,485		VOCs	USAF Permitted to DOE	26	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
153	1295	Bldg. 9956 Septic Systems		0.17	5,476		VOCs, Cn, Metals (Pb, Cr)	USAF Permitted to DOE	26	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
155	Archival	Bldg. 6597 25,000 Gallon	V	0.17						Industrial		Removed from RCRA Permit	LUST	None	None	
159	1303	Bldg. 935 Septic System	II	0.03	5,409			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
160	1295	Bldg. 9832 Septic System		0.12	6,245		VOCs, Cn, Metals (Cr, Ag, Ba)	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 6/9/00	Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
161	1295	Bldg. 6636 Septic System	III, V	0.16	5,383		VOCs, Cn, Metals (Ag)	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
165	1303	Bldg. 901 Septic System	II	1.16	5,408			DOE Owned		Industrial			Confirmatory Sampling (August 1994)	None	None	This site is an RMMA.
166	1303	Bldg. 919 Septic System	II	0.06	5,415			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.
167	1303	Bldg. 940 Septic System	II	0.07	5,409			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	
168	Archival	Bldg. 901 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
169	Archival	Bldg. 910 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
170	Archival	Bldg. 911 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
171	Archival	Bldg. 912 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
172	Archival	Bldg. 888 UST	I	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
173	Archival	Bldg. 6525 UST	III	0.00			None			Industrial		Removed from RCRA Permit	LUST	None	None	
174	Archival	Bldg. 6581 UST	IV	0.01			None			Industrial		Removed from RCRA Permit	LUST	None	None	
175	Archival	Bldg. 6588 UST	IV	0.00			None			Industrial		Removed from RCRA Permit	LUST	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
176	Archival	Bldg. 605 UST	I	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
178	Archival	Bldg. 6587 UST	III	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
179	Archival	Bldg. 7570 UST		0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
180	Archival	Bldg. 6503 UST	III	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
181	Archival	Bldg. 6500 UST	V	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
186	1302	Bldg. 859 TCE Disposal	I	0.24	5,422	300	TCE and other VOCs	DOE Owned		Industrial		Approved 3/00	Confirmatory Sampling (October 1996)	None	None	
188	Archival	Bldg. 6597 Above Ground Containment Spill Tank	V					DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
190	1302	Steam Plant Tank Farm	I	2.95	5,398	275	Petroleum hydrocarbons	DOE Owned		Industrial				None	None	
191	1335	Equus Red		3.58	5,398		DU	KAFB	None	Industrial			VCM-Based (January 1997)	None	None	This site is an RMMA.
192	1302	Waste Oil Tank	I	0.19	5,457	300	Petroleum hydrocarbons, Metals, VOCs, SVOCs	DOE Owned		Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
194	1335	General Purpose Heat Source Test Area		0.31	5,414		None	USAF Permitted to DOE	28	Industrial		Approved 9/97	Administrative (August 1995)	None	None	This site is an RMMA.
196	1306	Bldg 6597 Cistern	III, V	0.04	5,438		Oil, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
211	1302	Bldg. 840 Former UST 840-1	I	0.02	5,416	300	Chlorinated solvents, Metals, Coolant oil, PCBs	DOE Owned		Industrial		Approved 3/00	Confirmatory Sampling (October 1996)	None	None	
225	Archival	AEC Storage Facility/KAFB	Off Site									Site Transferred to KAFB 12/05/96		None	None	
227	1309	Bunker 904 Outfall (Tijeras Arroyo)	IV	0.07	5,400	300	Metals, VOCs, SVOCs, HE, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	This site is an RMMA.
229	1309	Storm Drain System Outfall	IV	0.16	5,374	300	Metals, VOCs, SVOCs, HE, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	

Refer to footnotes at end of table.

Table A-1. SNL/NM ER Site Characteristics for Stewardship (Concluded)

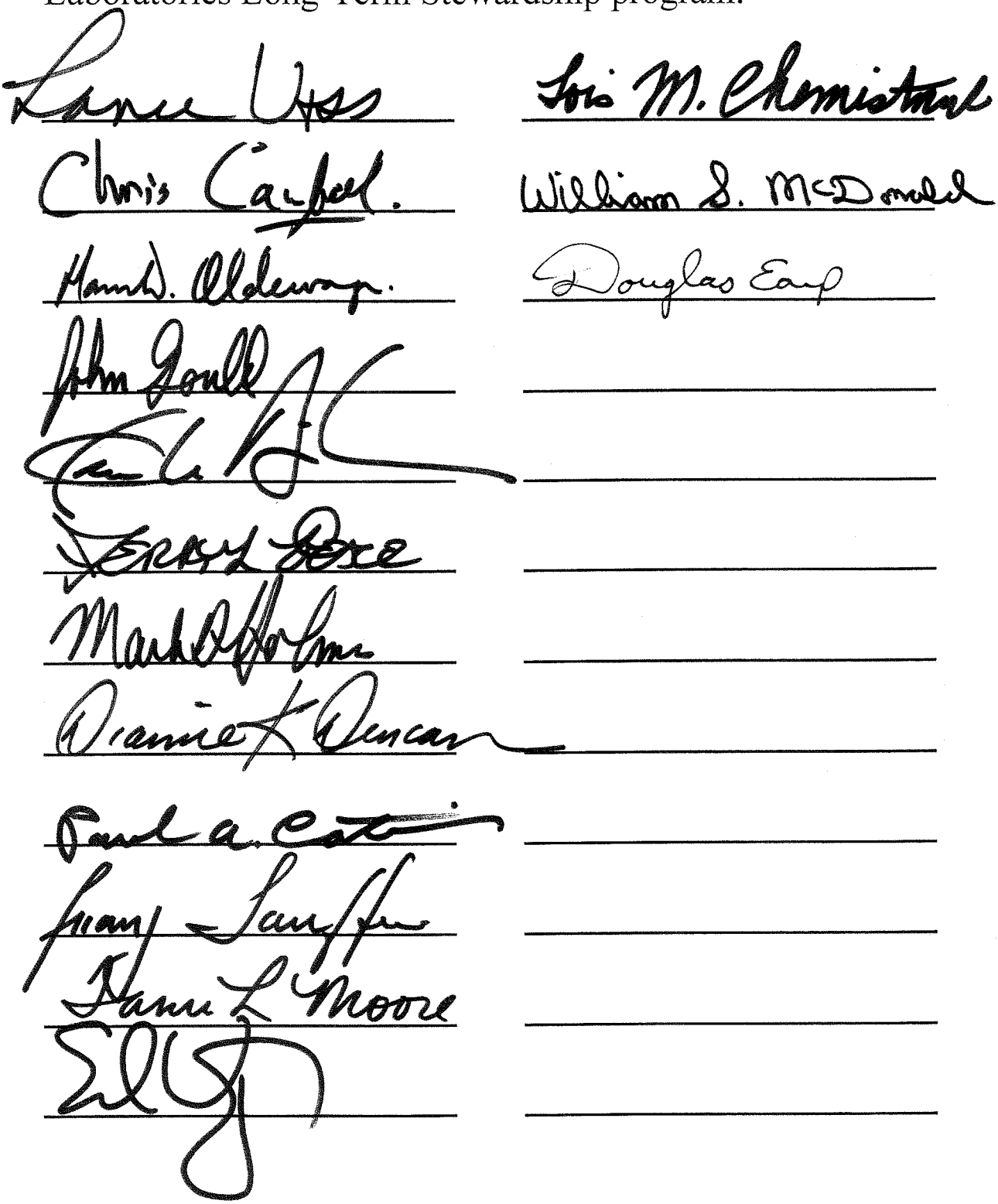
Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
230	1309	Storm Drain System Outfall	IV	0.02	5,346	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
231	1309	Storm Drain System Outfall	IV	0.04	5,336	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
233	1309	Storm Drain System Outfall	IV	0.03	5,360	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
234	1309	Storm Drain System Outfall	IV, KAFB	0.09	5,354	300	None	DOE Owned	Partly not permitted	Industrial			Risk-Based (June 1995)	None	None	
235	1309	Storm Drain System Outfall		1.20	5,318	450	None	KAFB	None	Industrial		Approved 3/27/2000	Confirmatory Sampling/Risk-Based (June 1995)	None	None	
240	1306	Short Sled Track	III, V	165.18	5,390			DOE Owned		Industrial				Yes	Yes	This site is an RMMA. This site is an active site.
241	1306	Storage Yard	III, V	3.32	5,420		Metals, HE, Radionuclides	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.

Note: As of June 6, 2001, the data presented in this table have not been verified and are considered to be DRAFT.

ADS = Activity data sheet.
AEC = Atomic Energy Commission.
Ag = Silver.
Ba = Barium.
Be = Beryllium.
Bldg. = Building.
Cd = Cadmium.
Cn = Cyanide.
COC = Constituent of concern.
Cr = Chromium.
DOE = U.S. Department of Energy.
DU = Depleted uranium.
ER = Environmental Restoration.
ft = Foot (feet).
H-3 = Tritium.
HE = High explosive(s).
HERMES = High Energy Radiation Megavolt Electron Source.
Hg = Mercury.
HMX = 1,3,5,7-Tetranitro-1,3,5,7-tetrazacyclooctane.
HSWA = Hazardous and Solid Waste Amendments.
JP-4 = Jet propulsion fuel grade 4.
KAFB = Kirtland Air Force Base.
LAARC = Light Airtransport Accident Resistant Container.
Li = Lithium.
LUST = Leaking underground storage tank.
LWDS = Liquid Waste Disposal System.
NFA = No further action.
Ni = Nickel.
Pb = Lead.
PCB = Polychlorinated biphenyl.
PDSP = Plutonium Dispersal Studies Project.
RCRA = Resource Conservation and Recovery Act.
RDX = 1,3,5-Trinitro-1,3,5-triazacyclohexane.
RMMA = Radiological Materials Management Area.
Se = Selenium.
SNL/NM = Sandia National Laboratories/New Mexico.
SOR = Starfire Optical Range.
SVOC = Semivolatile organic compound.
TA = Technical Area.
TCE = Trichloroethylene.
Th = Thorium.
TNT = 2,4,6-trinitrotoluene.
U = Uranium.
USAF = U.S. Air Force.
USFS = U.S. Forest Service.
UST = Underground storage tank.
VCM = Voluntary Corrective Measure.
VOC = Volatile organic compound.
Zn = Zinc.

APPENDIX B
Environmental Monitoring Task Group
Draft Input to Department of Energy DOE) and
Sandia National Laboratories/New Mexico (Sandia/NM)
Long-Term Stewardship (LTS) Plan
March 2001

The following stakeholders were members of the Environmental Monitoring Task Group and participated in the development of this report for the DOE/Sandia National Laboratories Long-Term Stewardship program.



Environmental Monitoring Task Group

Draft Input to Department of Energy (DOE) and Sandia National Laboratories/New Mexico (Sandia/NM) Long-Term Stewardship (LTS) Plan

March 2001

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Acronyms

AEA	Atomic Energy Act
CAMU	Corrective Action Management Unit
CSM	Conceptual Site Model
CWL	Chemical Waste Landfill
DOE	U.S. Department of Energy
EMP	Environmental Monitoring Plan
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration (Project)
ER/WM	Office of Environmental Restoration and Waste Management (DOE)
GWPP	Groundwater Protection Program
HSWA	Hazardous and Solid Waste Act
KAFB	Kirtland Air Force Base
LTS	Long-Term Stewardship
MOU	Memorandum of Understanding
MWL	Mixed Waste Landfill
NFA	No Further Action
NMED	New Mexico Environment Department
RCRA	Resource Conservation and Recovery Act
SWMU	Solid Waste Management Unit
TLD	Thermoluminescent dosimeter

1.0 Introduction

As Sandia National Laboratories/New Mexico (Sandia/NM) nears completion of its Environmental Restoration (ER) Project, the U.S. Department of Energy (DOE) and Sandia/NM are preparing a Long-Term Stewardship (LTS) Plan and have asked the general public for input and assistance. Three committees were formed in May 2000 to address the elements of LTS—one of which is the Environmental Monitoring Task Group.

The purpose of each Task Group, which consists of members of the public, Sandia/NM and DOE personnel, and representatives from the New Mexico Environment Department (NMED), is to identify community values and issues related to the development and implementation of long-term monitoring to support stewardship activities at Sandia/NM. This report summarizes the activities, concerns, and recommendations generated by this Task Group.

The goal of this report is to identify general strategies, elucidate specific areas of concern, and provide a framework for decision-making—not to prescribe the details of an environmental monitoring program—which is the responsibility of Sandia/NM, DOE and the NMED. The final LTS Plan will serve as a guide for DOE, Sandia/NM, regulatory organizations, and other stakeholders that will assume responsibility for ER sites, referred to as Solid Waste Management Units (SWMUs), that contain residual contamination after the ER Project is phased out. The current schedule projects the closure of all SWMUs to be completed by 2005, at which time the Sandia/NM ER Project will be closed out.

During the course of its tenure, the Environmental Monitoring Task Group was briefed and provided information on a variety of topics including Sandia/NM history, monitoring categories, existing regulations, and current Sandia/NM monitoring activities. Throughout these sessions, committee member concerns were presented, discussed, and analyzed. Ultimately, the focus or operational "problem statement" for this effort became "*how to monitor (within the Sandia/NM LTS Program) DOE legacy sites, or sites with restricted use, to ensure the long-term protection of human health and the environment from hazards posed by residual radioactivity and chemically hazardous materials.*"

What is Long-Term Stewardship (LTS)?

In establishing recommendations for future monitoring of sites, this Task Group was guided by the following definition of stewardship: "Activities necessary to maintain long-term protection of human health and the environment from hazards posed by residual radioactive and chemically hazardous materials." Long-term stewardship (LTS), as defined hereinafter refers to the physical and institutional controls that will be applied to closed SWMUs where residual contamination or other hazards remain. LTS also includes environmental monitoring and periodic assessment of sites to assure a safe status and remedial adequacy.

Sandia/NM's ER Project

Work conducted by DOE throughout its Nuclear Weapons Complex over the past 40 years has left a legacy of contaminated sites throughout the United States. DOE facility-specific ER Projects were created under DOE's Office of Environmental Restoration and Waste Management (ER/WM) to identify, assess, and remediate sites potentially contaminated by past spill, release and disposal activities. Initial identification of SWMUs at Sandia/NM was completed in 1987 as described in the document titled *Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment* (DOE 1987). The ER Project at Sandia/NM was formally initiated in 1992 to address all potentially contaminated sites resulting from Sandia/NM's past activities. The remediation and cleanup of SWMUs at Sandia/NM are regulated by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments Act of 1984 (HSWA). HSWA requirements apply to all SWMUs. Specific requirements for SWMUs are described in Module IV of Sandia/NM's RCRA Part B Operating Permit.

The SWMUs will be closed with varying levels of contamination. After remediation, a few sites, such as the Chemical Waste Landfill (CWL), the Corrective Action Management Unit (CAMU), and the Mixed Waste Landfill (MWL), will contain residual radioactive and/or chemical contaminants resulting from treated soils buried onsite or buried waste that will be contained and covered in place. For example, soils from the CWL, currently undergoing excavation, will be treated and placed in an engineered disposal cell at the CAMU. An engineered evapo-transpirative soil cover has been proposed for the MWL. The cover itself will be equipped with

various internal monitoring systems that will monitor soil moisture to detect any potential for contaminant migration.

Individual long-term environmental monitoring plans (EMPs), should be developed for these sites by DOE and approved by the NMED with stakeholder input. The EMPs should describe the type and frequency of monitoring with specific actions and mitigation measures that would be implemented if monitoring indicates contaminant migration. The specifics of these plans should be formed in part from the recommendations by the Environmental Monitoring Task Group.

2.0 Summary of Current Environmental Monitoring Programs at Sandia/NM

Sandia/NM's Environmental Management Department currently conducts environmental monitoring and surveillance as required, including air quality monitoring, terrestrial surveillance, groundwater surveillance, surface and storm water monitoring, wastewater sampling, and meteorological monitoring (see Appendix A). The current monitoring programs are developed to evaluate potential contaminant pathways from ongoing Sandia/NM operations (see Section 5.0). Examples are the site-specific groundwater monitoring wells that have been installed upgradient and downgradient from various SWMUs. Environmental restoration monitoring activities are designed for contaminant characterization at specific legacy sites.

3.0 Land Use Categories and SWMU Closure Status

When the NMED approves a SWMU through the NFA process, a future land use category is assigned to the site depending on the level of contamination remaining after cleanup. This section reviews land use categories (unrestricted and conditional release sites) and SWMU closure status categories, which discuss varying levels of administrative and physical controls and environmental monitoring requirements.

Land Use Categories

SWMUs are released under various land use categories depending on the type and extent of residual contamination remaining, if any. For example, in terms of future land use, the least restrictive land-use designation is “Residential,” which means there is no risk—or insignificant risk—present for future residents. Sites with higher residual contamination may not be appropriate for "Residential" but may still be safe for “Industrial” or “Recreational” land uses, such as constructing a factory or a parking lot, or providing a recreational open space area. A few sites, however, such as the CWL, the CAMU, and the MWL will remain unsafe for public use of any kind well into the future. These sites will require the highest level of institutional and physical controls to protect human health and the environment.

The post-closure (or release) status of all SWMUs at Sandia/NM can be divided into two broad categories as described below:

Unrestricted Release Sites – This includes SWMUs where no contamination was discovered during the remedial investigation process, as well as sites where cleanup efforts were successful in reducing the level of residual radioactive and/or chemical contamination to below regulatory levels of concern. This is a level that meets risk-based criteria for "Residential" use and therefore is considered safe for future unrestricted use. However, "Residential" land use does not necessarily imply that people will ever reside on the land. It simply designates the highest safety criteria.

In general, it is anticipated that sites approved for “Unrestricted Release” will require only an administrative/informational form of LTS. Although there are currently no plans to release any property from Sandia/NM or DOE control, records of the site investigation, cleanup methods, and final residual contamination status of these SWMUs must be maintained. No specific long-term environmental monitoring requirements are proposed or anticipated for these sites.

Conditional Release Sites - This includes SWMUs that have residual contamination above regulatory levels. There is a broad range of residual contamination, from the highest level

requiring some type of engineered remedy (covers, lined disposal cells, etc., which must be monitored and maintained indefinitely), to sites that have very little contamination and may be appropriate for "Industrial" and "Recreational" use. These designations are determined by the NMED based on risk-based criteria. Sites that would fall in the middle of this range include sites with chemical, radiological, or physical hazards, which would require a minimum of signs and fencing to protect human health.

SWMUs that are Conditionally Released may require long-term environmental monitoring depending on the physical form, level, and location of the contamination. Site-specific environmental monitoring plans (EMPs) should be developed for the three sites requiring engineered remedies (CWL, CAMU, and MWL). These plans must be adequate to ensure the integrity of the remedy, and to detect any contaminant migration from the site that may indicate an immediate or potential threat to human health or the environment. These site-specific EMPs proposed by the ER Project should be incorporated into the proposed LTS Plan for groundwater monitoring at some Conditionally Released sites.

Few if any, of these sites will require detailed site-specific EMPs (with the exception of the MWL, the CWL and the CAMU). In the opinion of the Environmental Monitoring Task Group, existing site-wide environmental surveillance programs should be modified to incorporate the long-term monitoring goals for all Conditionally Released sites.

SWMUs Closure Status

In 1992, at the inception of Sandia/NM's ER Project, there were more than 200 sites identified as being potentially contaminated based on past activities conducted by Sandia/NM. These sites included onsite and offsite areas in New Mexico and sites in Nevada, California, and Hawaii. From 1993 to 1996, 152 sites at Sandia/NM and offsite locations were investigated and proposed for "No Further Action" (NFA) after assessment and/or remediation. Many of these sites are still awaiting final acceptance by NMED for closure and issuance of an NFA. At the close of 1999, there were 146 SWMUs remaining on Sandia/NM's HSWA permit.

There are two types of NFA designations, either "Administrative" or "Risk Based." It is anticipated that most SWMUs will eventually be signed off by the NMED with an NFA designation. However, this is not to say that regulatory oversight will stop or that Sandia/NM and DOE will have no further responsibilities for those sites. The challenge for ensuring proper and ongoing stewardship will continue for many years into the future. A designation of NFA can also be revoked at the discretion of the NMED if, at a later date, the NMED determines that further actions, such as excavation and cleanup, are required. The NMED may also change the level of monitoring required during the stewardship period. The LTS Plan must be a living and flexible plan amenable to changes as new information becomes available, or as requirements change.

Stewardship Categories

The SWMUs at Sandia/NM fall into one of the following four categories for stewardship:

1) **Engineered Units/Landfills –** There are currently three sites in this category: the CWL, the CAMU and the MWL. These units will require engineered controls, such as landfill covers and disposal cells, and sustained monitoring to ensure their closure status.

2) **Signed and Fenced Units –** There are currently 13 sites in this category. These sites have mainly physical hazards present, such as mineshafts or pits. A few of the sites in this group will contain sufficient levels of residual contamination to warrant long-term environmental monitoring.

3) **Signed Units –** There are currently 66 sites in this category, most of which have been issued NFA status. A few have residual contamination above background levels, but at low enough levels for an "Industrial" or "Recreational" land use designation. Because there is still some risk present, it is expected that some level of environmental monitoring will be necessary.

4) **No Site Control Required Units –** There are currently 135 sites in this category. Current land use scenarios indicate that all will be either "Industrial" or "Recreational." However,

these sites either pass "Residential" land-use criteria or all residual contaminants are below background levels. Periodic monitoring should be employed to ensure continuing safety.

4.0 Controls and Monitoring Requirements

Stewardship Requirements

Long-term stewardship requirements may include some or all of the following controls:

- **Fencing and Signage** – Physical controls must be properly maintained;

- **Engineered Controls** – Systems such as landfill covers and lined disposal cells will be monitored to assure containment of any residual contamination;

- **Environmental Monitoring Equipment** – Includes all monitoring systems such as groundwater monitoring wells, buried detection systems, and ambient radiation detectors (thermoluminescent dosimeters [TLDs]);

- **Land ownership documentation** – All significant historical information about the site must be documented so that any future land transfers will convey adequate information to ensure that future land uses are compatible with any hazards present; and

- **Dedicated Funding** – Funds must be available into the future from DOE, successor organizations, or other such delegated organizations, to assure that there will be enough resources to carry out all stewardship requirements.

Administrative and Physical Controls

Various levels of administrative and physical controls, dependent on the hazards present, must be instituted to ensure that future activities at the site are restricted and commensurate with the designated land use to ensure the protection of human health and the environment. They include the following:

- **Administrative Monitoring** – Assures deed restrictions, land use restrictions, etc., are enforced and not violated;

- **Physical monitoring** – Assures the integrity of physical structures (e.g., landfill covers, disposal cells, berms, operating remedial systems, gates, and fences); and

- **Contaminant monitoring** – Assures and maintains the safe status of areas under stewardship, as well as detect and locate any constituent release and migration.

Environmental Monitoring Program Design and Considerations

The primary goal of a LTS environmental monitoring program is to verify, through sampling that closure for each site continues to be protective of human health and the environment. To achieve this goal, monitoring programs should be designed to:

- Provide early detection of contaminant release;
- Identify the source of contaminants and allow for mitigation before any potential impacts to human health;
- Characterize trends in the natural, or unaffected system; and
- Verify compliance with environmental regulations and commitments made in regulatory permits or closure plans.

To effectively carry out the above goals, Sandia/NM must have an effective environmental monitoring program in place. The key in designing an effective monitoring strategy is to first identify the important contaminant pathways present at each site. (Contaminant pathways are detailed in Section 5.0). Environmental monitoring should be scaled to the requirements of each SWMU. Some SWMUs, such as the CWL, the CAMU and the MWL will require individual monitoring, while SWMUs with low-risk surface contamination may be monitored as a group.

Appropriate sampling locations would be based on topographical, hydrological, and meteorological considerations. Sampling at strategic locations, which could provide an

indication of the accumulation of contaminants from multiple SWMUs, is also the most cost efficient means of sampling. In the event that contamination is detected above a predetermined action level at a sampling site, a follow-up sampling strategy should be developed to determine the exact source(s) of the contamination.

The environmental media to consider in the design of a sampling program at Sandia/NM include air, surface and subsurface soils, vegetation, arroyo sediments, groundwater, and surface water (including storm water runoff and water from springs). Sampling may be performed directly in the transport medium, such as air or storm/surface water runoff, or in downwind or downstream media to detect the accumulation of contaminants over time. Direct sampling of air, surface water, and groundwater may be appropriate for those sites with the potential for significant releases.

5.0 Contaminant Pathways in the Environment

The types of monitoring required at various SWMUs will be dependent on the nature of the contaminants present and the potential pathways to receptors. Pathways are defined by routes—both direct and indirect—that can lead to inhalation or ingestion of contaminants. Direct pathways include exposure to radiation from a site, inhalation of suspended contaminated particles, ingestion of contaminated groundwater, and any other direct exposure to contaminants. Indirect pathways include contaminants that move through the food chain. For example, food could become contaminated by groundwater sources used for irrigation. Pathways in the environment are dependent on geologic and geographic factors, including soil type and consolidation, bedding structures, surface topography, depth to groundwater, faults and fractures, and the proximity to surface water runoff channels and arroyos, to name a few.

The following techniques are typically used to monitor potential contaminant pathways:

- **Groundwater Monitoring –** Contaminants on the surface or in the subsurface (vadose) may be transported to the groundwater by percolation through the vadose (or unsaturated) zone.

Groundwater contaminants could present a direct human exposure pathway through ingestion of contaminated drinking water, or indirectly following irrigation of crops and subsequent ingestion of contaminated foodstuffs.

- **Terrestrial Surveillance –** Contaminants in soil and vegetation could be consumed allowing contaminants to persist in the food chain.

- **Air Monitoring –** Surface contamination may become airborne and pose a risk to receptors. Airborne contaminants can present a direct human exposure pathway through inhalation and external exposure, or may be deposited elsewhere on soil, vegetation and surface water, and provide a subsequent exposure pathway through ingestion.

- **Ambient External Radiation Monitoring –** For sites contaminated with radioactive materials, ambient radiation measurements may be appropriate using thermoluminescent dosimeters (TLDs).

- **Surface Water and Storm Water Monitoring –** Contaminants present at the surface could be transported by surface water runoff from a site and subsequently deposited elsewhere on soil, sediments, or vegetation, or carried to a surface water body. Waterborne contaminants may present a human exposure pathway through ingestion of contaminated water, by ingestion of contaminated soil or food, or external exposure to deposited contamination (in the case of radioactive material).

- **Vadose Zone Monitoring –** The vadose zone is the unsaturated zone above the water table (from the surface to the saturated zone). Vadose zone monitoring will primarily consist of near surface measurements of soil moisture and soil gas at engineered closure sites. Any changes in soil moisture or soil gas within an engineered system may indicate a potential mechanism for contaminants to become mobile.

6.0 Decision Logic for SWMUs and Determining the Monitoring Method

Because there are still ER Project cleanup activities in progress and the final status of each SWMU is currently unknown, the Environmental Monitoring Task Group cannot be expected to define the details of a long-term environmental monitoring program. However, the Task Group developed a basic decision-making process for groundwater shown in Appendix B, which will serve as a guide for Sandia/NM and DOE to develop an effective environmental monitoring program as more details become available. The decision logic chosen should define the long-term monitoring strategy; specific monitoring methods should be detailed in site-specific environmental monitoring plans (EMPs).

Site stewards need to understand the potential for breaks in the barriers to occur, and have contingency plans for addressing the situation before problems occur. This information can be organized and characterized for each SWMU with a management tool called an "uncertainty management matrix" as shown in Appendix C.

7.0 Monitoring Roles and Responsibilities

The members of the Environmental Monitoring Task Group recognize the need for the NMED and local regulatory input on the LTS concept. The public requires and deserves a firm commitment by the federal government to provide the resources for long-term monitoring and additional remediation, if it becomes necessary. Members of the Task Group suggested that a Memorandum of Understanding (MOU) be developed between the DOE, NMED, the City of Albuquerque, Bernalillo County, and affected Tribal governments to formalize a multi-agency LTS commitment. The MOU should identify which agencies are responsible for administrative controls, funding, physical controls, and monitoring constituents of concern.

8.0 Concerns and Recommendations

The Environmental Monitoring Task Group brought up the following concerns. Specific recommendations address each concern. Additional stand-alone recommendations are also listed.

- **Regulatory Drivers**

  Concern: The Task Group recognizes that Sandia/NM is contractually obligated to conduct an environmental surveillance program in accordance with DOE Orders. However, this Task Group also recognizes that there are no regulations specifically addressing the issue of LTS. The Task Group is concerned that without a hard regulatory driver it may be difficult for the DOE and Sandia/NM to obtain the necessary funding and resources to carry out their responsibilities to the community in the future. Also, there is a concern about the lack of formal regulations regarding the vadose zone.

  Recommendation: The Task Group recommends that specific regulations should be developed by NMED to establish drivers for a LTS Plan. Although the existing legal framework applied to environmental monitoring is well regulated, regulations specific to the vadose zone are mainly non-existent. Therefore regulations should be developed to ensure that LTS requirements are protective of the vadose zone and its potential pathways. This is a condition that should be remedied by either Congress or the State legislatures, or both.

- **Funding**

  Concern: The routine environmental surveillance programs at Sandia/NM are indirectly funded (out of corporate overhead) as opposed to directly funded from DOE. Over the past several years, the funding level for all indirect programs has been reduced—with that trend likely to continue. The Task Group is concerned that a monitoring program for LTS will result in an increased demand for resources, in a situation where budgets have been, and will continue to be, reduced. This must not occur. Long-term environmental surveillance programs should be added to the existing permit.

Recommendation: The Task Group recommends that DOE, and its successors, commit to specific, direct funding for long-term monitoring under the LTS program. Consideration should be given by DOE to provide direct funding for all environmental surveillance programs conducted at the labs. The Task Group feels that these critical programs, which are in place to verify Sandia/NM's and DOE's commitment to protecting public health and the environment, should not be subject to arbitrary corporate budget cuts, but rather should have a secure source of funding in the future.

- **Flexibility of Monitoring Plans**

  Concern: The Task Group believes that future monitoring plans must be prepared to manage and predict our physical environments as the dynamics of the monitoring changes. Therefore, the Task Group is concerned that monitoring plans remain flexible over time. The frequency of monitoring should be determined according to risk type at each site or group of sites, which may change as a result of site dynamics or regulatory requirements. An agreement by State, County, and City agencies is necessary if any significant changes are made to monitoring plans.

  Recommendation: The Task Group recommends that monitoring plans be designed to remain flexible to take advantage of new technologies, changing public expectations and, to an extent, changing budget constraints, but not to the detriment of maintaining integrity of the monitoring. Periodic technical review and reevaluation should be part of the overall monitoring plan. However, development of specific environmental monitoring plans and procedures should be left to DOE and Sandia/NM technical specialists, with review and oversight by appropriate regulatory entities and the public.

- **Site-Specific Environmental Monitoring Plans (EMPs)**

  Recommendation: The Task Group recommends that site-specific EMPs be developed for the "Conditionally Released" sites requiring engineered remedies for closure (CWL, CAMU, and MWL). The Task Group has been presented with a draft overall monitoring plan for the MWL. The proposed plan is being reviewed, and may change, but the Task Group feels that

for this approach, site-specific plans for the higher risk sites are appropriate.

- **Scope of Monitoring**

  Recommendation: The Task Group recommends that LTS be maintained for as long as necessary with DOE accepting continued responsibility for all of its sites. In addition to monitoring sites to determine contaminant migration outside the SWMU boundary, monitoring programs should also be designed to monitor the contaminants within the site to continually assess the risk associated with the site and to evaluate if additional remediation may be undertaken without undo risk to site workers.

- **Groundwater Monitoring Wells**

  Recommendation: The Task Group recommends the use of longer screened, multi-ported groundwater wells to increase well life and reduce cost.

- **Public Involvement**

  Concern: The Task Group recognizes that there is a need for on-going public input to the LTS process to develop a sense of the public's concerns regarding the stewardship plan for Sandia/NM.

  Recommendation: The Task Group recommends that the site-specific monitoring plans and any modifications to Sandia/NM's existing surveillance programs be documented and made available to the public for review. The public should have the opportunity to periodically review and comment on this and other monitoring plans as they become available.

- **Overall Groundwater Monitoring Plan for LTS**

  Recommendation: The Task Group was briefed on the draft "*Sandia/NM Long-term Groundwater Monitoring Proposal"* (see Appendix D). This proposal addresses groundwater monitoring specifically related to those sites that will remain with a known or potential source of groundwater contamination. The Task Group recommends that this proposal be adopted, with appropriate modifications given the known conditions at the time of site closure. The proposal is based on proven, complex hydrogeologic models, and

provides a systematic and defensible approach for monitoring, utilizing the concept of "sentry wells" to provide early indication of a groundwater problem. The proposal, coupled with the site-wide Groundwater Protection Program (GWPP), provides the appropriate level of public assurance that DOE and Sandia/NM are committed to the monitoring and protection of this valuable resource.

- **Environmental Surveillance Programs**

  Recommendation: The Task Group recommends that the existing environmental surveillance programs at Sandia/NM be utilized, to the maximum extent that is technically defensible, to accomplish long-term monitoring in support of LTS. Some modifications to the programs will likely be required to ensure that the objectives of LTS are met, and these modifications should be based on known site conditions at the time of site closure.

- **Quality Assurance Program**

  Recommendation: Since public confidence in the monitoring data collected during LTS is critical to the success of LTS, a very visible and prominent data quality assurance program needs to be included in the LTS Plan.

- **Uncertainty Matrices**

  Recommendation: The Task Group recommends the development of uncertainty matrices for "Conditionally Released" sites (see Appendix C).

- **Models**

  Recommendation: The Task Group recommends the development of post remediation conceptual site models as illustrated in the draft *DOE Long-Term Stewardship Study* (DOE 2000).

  Recommendation: The Task Group recommends that Sandia/NM's sediment testing and multiple location sampling model be used for environmental monitoring.

Recommendation: The Task Group recommends that a soil transport model be used to calculate timing for contaminant transport within arroyos.

References

DOE 2000 U.S. Department of Energy, *DOE Long-Term Stewardship Study*.

DOE 1987 U.S. Department of Energy/Albuquerque Operations Office (DOE/AL), *Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment*, draft DOE/AL, Environment, Safety and Health Division, Albuquerque, NM (September 1987).

SNL 2001 Sandia National Laboratories, *1999 Annual Site Environmental Report, Sandia National Laboratories, Albuquerque, New Mexico,* SAND 2001-2228. Sandia National Laboratories, Albuquerque, NM (Final version remains unpublished pending DOE release).

SNL 1996 Sandia National Laboratories, *Environmental Monitoring Plan, Sandia National Laboratories, Albuquerque, New Mexico,* 75-1013. Sandia National Laboratories, Albuquerque, NM (1996).

Glossary

Baseline – A quantitative expression of planned costs, schedule, and technical requirements for a defined project. Baselines should include criteria to serve as a standard for measuring the status of resources and the progress of a project.

Cleanup – The process of addressing contaminated land, water and facilities, nuclear materials, and hazardous waste produced by past nuclear weapons production activities in accordance with applicable requirements. Cleanup does not imply that all hazards will be removed from the site. This function encompasses a wide range of activities, such as stabilizing contaminated soil; treating groundwater; decommissioning process buildings, nuclear reactors, chemical separation plants, and many other facilities; and exhuming sludge and buried drums of waste. The term "remediation" is often used synonymously with cleanup.

Conceptual Site Model (CSM) – A set of qualitative assumptions used to describe a system or subsystem for a given purpose. CSMs are used during cleanup actions to depict the relationship between existing hazards, environmental transport mechanisms, exposure pathways, and ultimate human and ecological receptors. CSMs can also be used to distinguish between unknown and known site conditions (such as the existence of fractured bedrock and other preferential pathways for groundwater flow).

Contingency Plan – Preparations for unexpected or unwanted circumstances, such as the failure of an engineered control or an unfavorable environmental change (e.g., flooding).

Conditional Release – Land use status that restricts the types of activities that may occur. An ER site with minimal contamination, but which is still above regulatory standards may be appropriate for "Industrial" use or "Recreational" use but no "Residential" use. Higher level hazards remaining at a site will not be appropriate for any public use and will require stricter controls including fences, signs, and monitoring.

Decommissioning – The process of removing a facility from operation followed by closure activities that include decontamination, entombment, dismantlement, or conversion to another use.

DOE Orders – Internal requirements of the DOE that establish policy and procedures, including those for compliance with applicable laws. DOE Orders are established by DOE under the Authority of the Atomic Energy Act (AEA), and are not enforceable by external parties (e.g., other federal regulators).

Engineered Control – Man-made controls designed to isolate and contain residual contaminants in place. These include landfill covers and caps for radioactive, hazardous, and sanitary landfills; vaults; repositories; and in-situ stabilization.

Exposure Pathway – A route that a chemical or physical agent takes through the environment from the source of contamination to an exposed organism. This may include direct exposure pathways such as through the air or indirect exposure pathways in which contaminants accumulate within environmental media and are passed along through the food chain.

Hazards – Chemical or radioactive materials or physical conditions that have the potential to cause adverse affects to health, safety, or the environment.

Hazardous Waste – A category of waste regulated under the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. 6901 et seq.). Hazardous waste is a sub-category of "RCRA Solid Waste" (which includes liquids). RCRA hazardous waste exhibits at least one of four characteristics—ignitability, corrosivity, reactivity, or toxicity—or is specifically listed by the U.S. Environmental Protection Agency (EPA) in 40 CFR 261.31 to 40 CFR 261.33. Radiological waste (including source, special nuclear, or by-product materials) as defined by the Atomic Energy Act (AEA) are not regulated under RCRA. However, mixed waste, which contains both hazardous and radiological constituents is regulated by RCRA.

In-situ – In its natural position or place. This may refer to in situ remediation, which treats buried hazardous materials in place such as through bioremediation, grouting, and vapor extraction.

Long-Term Stewardship (LTS) – The physical controls, administrative management, and environmental monitoring that will be implemented after the remediation and closure of past release sites, or Solid Waste Management Units (SWMUs), where residual contamination or physical hazards remain. LTS includes all activities required to protect the human health and the environment from hazards remaining after cleanup is complete.

Radiation – In the context of radioactivity, this is energy in the form of ionizing radiation produced from radioactive decay and primarily includes alpha and beta particles and gamma emissions.

Radioactivity – The spontaneous transformation of unstable atomic nuclei.

Radionuclide – An unstable radioisotope, which undergoes spontaneous transformation and emits radiation.

Receptor – Any human or other living thing that could be exposed and/or threatened by hazardous or toxic contaminants.

Risk – Risk defines the probability or likelihood that a hazard will cause potential harm to a receptor, including human populations or ecological communities. The existence of a hazard does not automatically imply the existence of a risk since risk requires a pathway (to a receptor) for an exposure to occur. Risk is expressed (qualitatively or quantitatively) in terms of the likelihood that an adverse effect will occur as a result of the existence of the hazard.

Unrestricted Release – Land use status upon which there are no restrictions on the types of activities that may occur, including permanent residential use.

Appendix A

Current Scope of Sandia/NM's Environmental Programs

Regulatory requirements and U.S. Department of Energy (DOE) Orders drive the environmental programs currently in place at Sandia National Laboratories, New Mexico (Sandia/NM). Detailed descriptions of these, and other environmental monitoring programs at Sandia/NM can be found in the *Environmental Monitoring Plan* (SNL 1996), and in the 1999 *Annual Site Environmental Report* (SNL 2001) as well as specific program documents such as procedures and sampling and analysis plans. The scope of Sandia/NM's environmental programs is briefly described below.

Groundwater Protection Program (GWPP)

- Focus on regional ground water quality and characterization of ground water flow
- Base-wide GWPP includes:
  - Monthly water level measurements in 126 wells
  - Annual water quality measurements in 14 wells and one spring, analyzed for volatile organic compounds (VOCs), total organic halogens (TOX), phenols, general inorganics, metals, radioactive constituents (gamma, isotopic uranium, alpha/beta, and radium-226/228)
- Work closely with Environmental Restoration (ER) Project monitoring programs (52 wells)

Storm Water Program

- Currently five stations, 4 more planned - sampled when flow is present, analyzed for metals, ammonia, nitrate plus nitrite, chemical oxygen demand (COD), total kjeldahl nitrogen (TKN), cyanide, oil/grease, radioactive constituents (alpha/beta), and polychlorinated biphenyls (PCBs)
- Construction-related fencing and monitoring
- Solid Waste Management Unit (SWMU)-specific monitoring (four current in Arroyo del Coyote - Site 16 and Burn Site)

Air Quality Program (Clean Air Network)

- Particulate matter less than 10 μm in diameter (PM_{10}) (four stations - sampled 24 hours every 6 days), analyze for mass loading, metals and radioactivity
- Criteria Pollutants (one station - continuous sampling), analyze for SO_2, CO, NO, NO_2, O_3
- VOCs (four stations - sampled 24 hours monthly), analyze for 25 VOC species

Meteorological Monitoring Program

- Site-wide network of eight meteorological towers
- Data supports modeling efforts for other air quality programs and emergency management
- Continuous data collection at all towers, server updated every 15 minutes

Terrestrial Surveillance Program

- Sampling conducted annually at 39 on-site, 17 perimeter, and 16 offsite locations
- Sample media: soil (49), sediment (10), and vegetation (29), analyzed for metals and radioactive constituents (gamma spectroscopy, tritium and total uranium)
- Ambient radiation monitoring using thermoluminescent dosimeters (TLDs) at 34 locations
- Trending and other statistical analysis to compare on-site and perimeter results with community

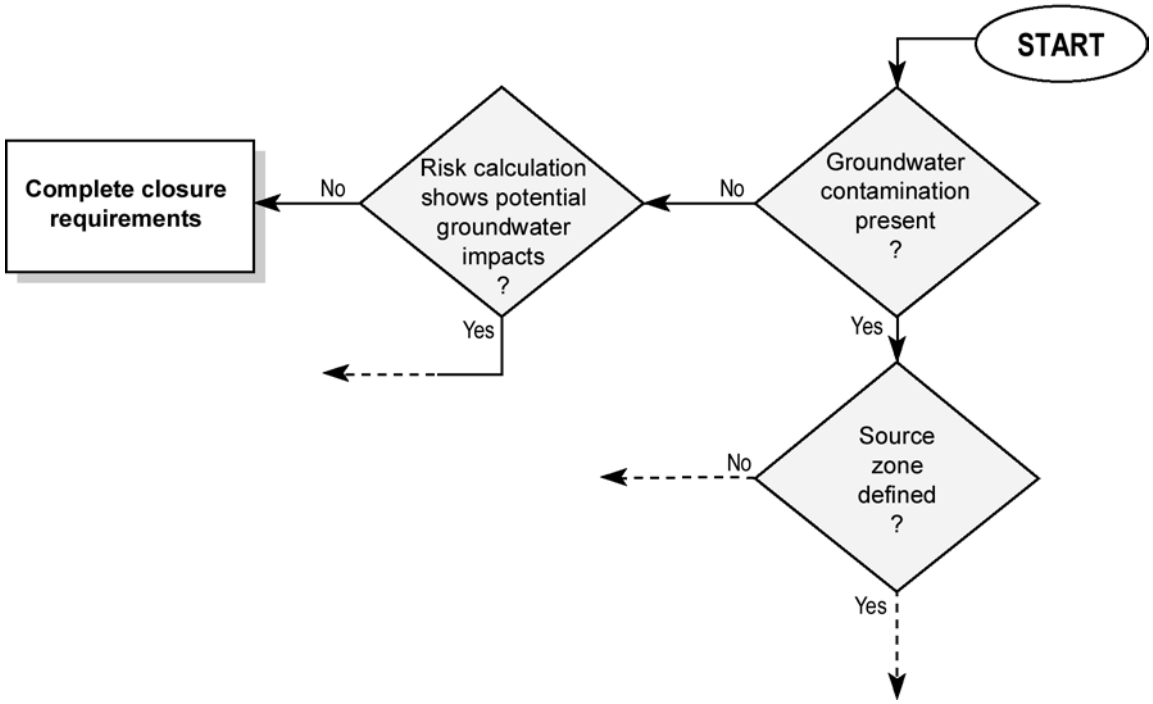
Ecological Surveillance Program

- Small mammal, large mammal, reptile, and bird population studies
- Small mammal contamination studies, analyzed for metals and radioactive constituents (gamma, tritium, isotopic strontium-90)
- Vegetation population study

Appendix B

LTS Decision Logic Process

Example of Decision Logic



Appendix C

Example Uncertainty Matrix for Long-Term Stewardship

Expected Condition	Reasonable Failure	Probability of Occurrence	Time to Respond	Impact	Monitoring Plan	Contingency Plan
Cover prevents infiltration and subsequent leachate development.	Burrowing animals or plant roots will breach cover integrity.	High. Operations of other landfills indicate that over time this is a common intrusion scenario.	Short for animals. In the case of plants, it takes time to establish a deep root system.	Significant since cover integrity will be lost and leachate is likely to carry contaminants to the groundwater.	Site inspection every 3 months to ensure integrity of cover.	A biointrusion barrier could be installed to deter burrowing animals. Since lead times are quite short for this pathway, it may be better to install this barrier at the onset (robust design). Plant removal upon detection should mitigate root intrusion.
Access and institutional controls will prevent excavation through cover.	Humans will dig in the area of the landfill, breaching integrity of the cover.	Low. Additional controls (i.e., land use restrictions and a fence) are in place to prevent human intrusion.	Short for direct contact of humans, longer for loss of cover effectiveness with respect to infiltration	Same as above. In addition, intrusion into the soil would likely result in dermal contact with radioactive contaminants, posing an unacceptable risk to human health.	Site inspection will include surveillance of cover condition, evaluation of fence integrity and maintenance of land use controls..	Reevaluation of remedy will be conducted if humans breach the integrity of the cover and land use controls are not functional. Options may include more sophisticated fence designs, site security, and armoring
Contaminants in the groundwater will naturally attenuate to levels below Maximum Contaminant Levels (MCLs) within a 20-year timeframe.	Contaminants do not attenuate naturally to levels below MCLs within the required timeframe.	Low. Based on modeling of site conditions, contaminant characteristics, and the general trend established by existing monitoring data, MCLs will be attained within a 20-year time frame.	Long. Monitoring data will indicate if the current trend in contaminant reduction changes. Based on these data, the site manager will have advance warning if end objectives will not be met in 20 years.	High. If groundwater remediation goals cannot be reached in 20 years, regulators will require a different more costly remediation approach. 2. Low. Land use restrictions and alternate drinking supply prevent ingestion.	Wells within the plume will be sampled every three months to ensure that natural attenuation is reducing the concentration of contaminants in the groundwater. Sentinel wells will be monitored quarterly to detect any escape near receptor wells.	If data indicate significant negative deviation from predicted trends in plume concentrations, an extraction type of remedy

Appendix D

Draft MWL Groundwater Monitoring Proposal

Currently groundwater is being monitored on an annual basis. This monitoring frequency should be continued. However, we are also proposing both landfill cover and vadose zone monitoring systems at the MWL.

For the purpose of verifying their performance, the vadose zone and cover systems should be monitored quarterly for a period of three years. If no releases are detected, monitoring should be reduced to semi-annually for the next three years. Thereafter, a request for an approval of annual monitoring should be submitted to NMED.

Performance/monitoring reports should be submitted annually for the first three years. Following this period, reports detailing the cover performance and monitoring results should be submitted every three years (during the entire monitoring period, the annual analytical results for groundwater monitoring at the MWL would also be included in the permit-required Annual Groundwater Monitoring Report).

Any verified exceedances of expected cover parameters should be reported to NMED within 5 days. Any verified groundwater or vadose zone analytical results indicating possible contamination should be reported to NMED within 24 hours. NMED should be requested to split verification samples.

Reports to the public on the MWL should be presented annually as part of our permit-required quarterly public meetings.

At ten-year intervals, a report should be prepared considering the feasibility of remediating the landfill. This report should address the expected current activity levels of the waste, the threat to remediation workers from that activity level, advances in remediation technologies, the availability of off-site disposal facilities, any possible land use changes or land transfers, and the projected costs of excavation/waste disposal, as well as a summary of the performance and

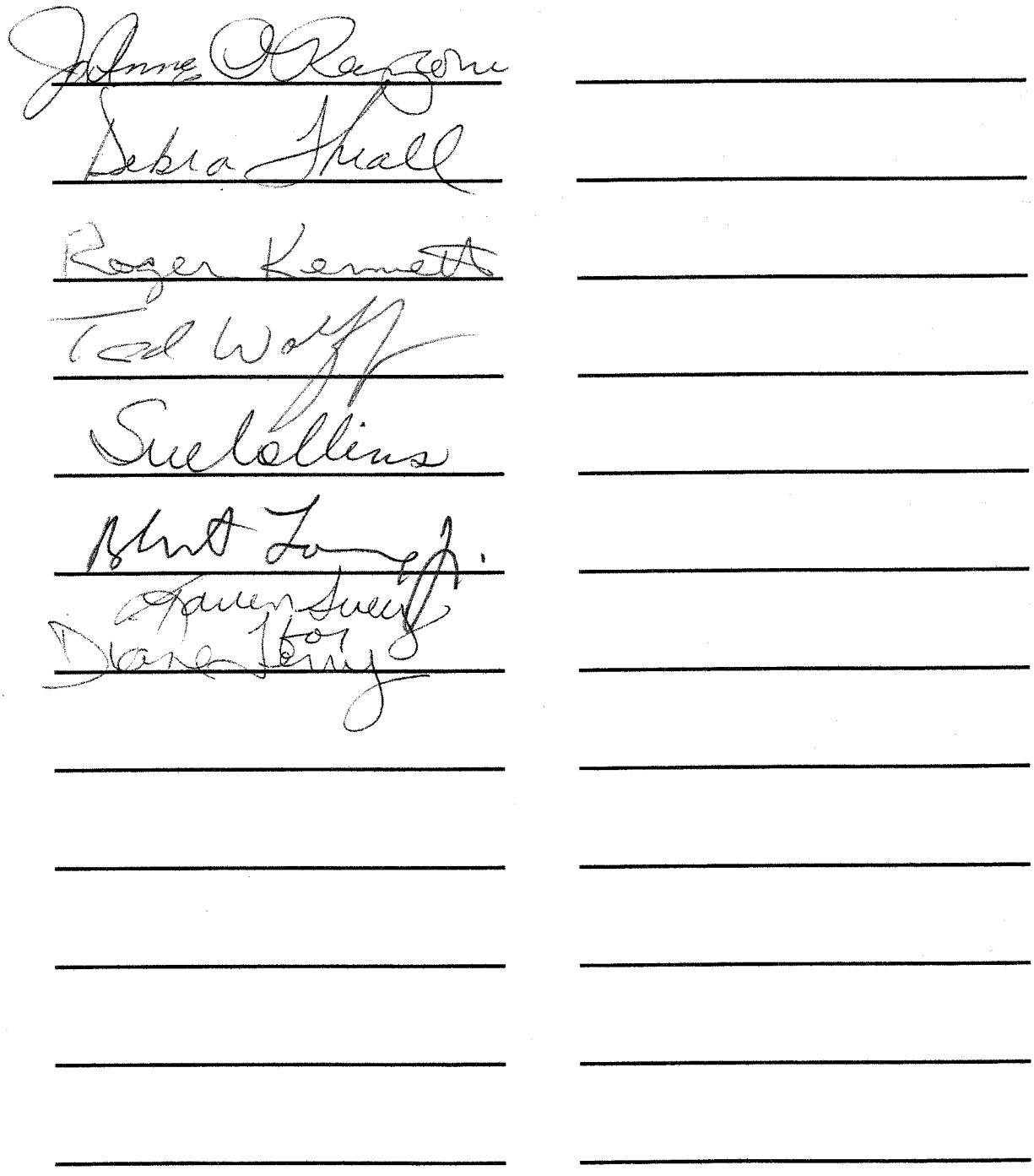
monitoring data collected to date. These reports should be submitted to NMED and presented to the public in specific, well-advertised public meetings.

Following each of these decadal reports, NMED would, as they would at any time during the stewardship period, have the option of requiring remediation of the landfill if it is determined that the MWL poses a threat to human health or the environment.

If at any time monitoring should indicate that there has been a release from the landfill with the potential to impact human health or the environment, the Department of Energy has the option of initiating a voluntary corrective action to remediate the problem. Approval of the remediation plan should be sought from NMED.

APPENDIX C
LTS Management Task Group
Input to Department of Energy (DOE) and
Sandia National Laboratories/New Mexico (Sandia/NM)
Long-Term Stewardship (LTS) Plan
May 2001

The following stakeholders were members of the Long-Term Stewardship Management Task Group and participated in the development of this report for the DOE/Sandia National Laboratories Long-Term Stewardship program.



March 14, 2001

LTS Management Task Group

Input to Department of Energy (DOE) and Sandia National Laboratories/New Mexico (Sandia/NM) Long-Term Stewardship (LTS) Plan

May 2001

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I. INTRODUCTION

History

The Department of Energy (DOE) and Sandia National Laboratories, New Mexico (SNL/NM) are nearing the end of a 10+ year environmental restoration (ER) project. The project has grown from information gathering and characterization to full-scale environmental restoration of technically challenging contaminated sites. In the next several years, the active cleanup portion of the project will end and so planning for long-term stewardship of these sites has begun. (For more information, see the LTS web site: **http://www.sandia.gov/ltscenter/lts_center.html.**

At a public meeting on May 4, 2000 DOE and SNL started a public involvement process to determine what were the public values on long-term stewardship of ER sites. At this meeting DOE and SNL asked for volunteers to participate in a public task group to address the topics of (1) Stewardship Management, (2) Data Management and Institutional Controls, and (3) Environmental Monitoring. The volunteers who chose to join the Stewardship Management Task Group accepted responsibility for providing inputs on how LTS should be managed. At the LTS stakeholder meetings on August 24 and November 14, opportunities provided for public inputs and useful ideas for stewardship management were obtained from the public and members of the other task groups.

The Stewardship Management Task Group established five goals for itself:

- Identify stewardship responsibilities
- Identify management structure and vision
- Identify funding sources
- Identify public outreach media/education
- Suggest legal and legislative drivers.

Each of these goals is addressed in sequence in the following sections of this report.

Definition of Stewardship

At its first meeting, the Stewardship Management Task Group developed the following definition of stewardship in relation to the environmental restoration sites at SNL/NM. This definition is based upon one generated by the Oak Ridge Stewardship Working Group and provided a foundation for the work of this task group.

> *Long Term Stewardship is the ongoing acceptance of the responsibility and the implementation of activities and processes necessary to maintain and monitor long-term protection of human health and of the environment from hazards posed by residual radioactive and chemically hazardous materials and wastes.*

Vision of the LTS Plan

The Stewardship Management Task Group's vision for the SNL/NM LTS Plan is that it be dynamic with respect to execution and monitoring and it be adaptive (even self-correcting, if possible). The Plan must be flexible and provide for review and possible inclusion of new environmental restoration/stewardship technologies. It must address short term needs, during the period when the RCRA permit is still in force, and also provide a means for resolution of longer term issues that may arise when no such permit exists. Finally, it must present a clear commitment to stewardship by the stewards.

Participants and Meetings

The following citizens participated in one or more meetings of the Stewardship Management Task Group: Dave Bourne, Will Hoffman, Roger Kennett, Rich Kilbury, Bob Long, Hal Marchand, JoAnne Ramponi, Craig Richards, Diane Terry, Debra Thrall, Ramona Torres-Ford, Ted Truske, Gary Yeager. Sue Collins and Ted Wolff, both members of SNL/NM's Environmental Restoration Project, were task group leader and facilitator respectively. Dick Fate, in charge of preparing the LTS Plan at SNL/NM, attended our first meeting. Will Keener, also a member of SNL/NM's Environmental Restoration Project, Beth Oms from the local Department of Energy (DOE) office, and Karren Suesz, administrator of the Community Resources Information Office, attended one or more meetings.

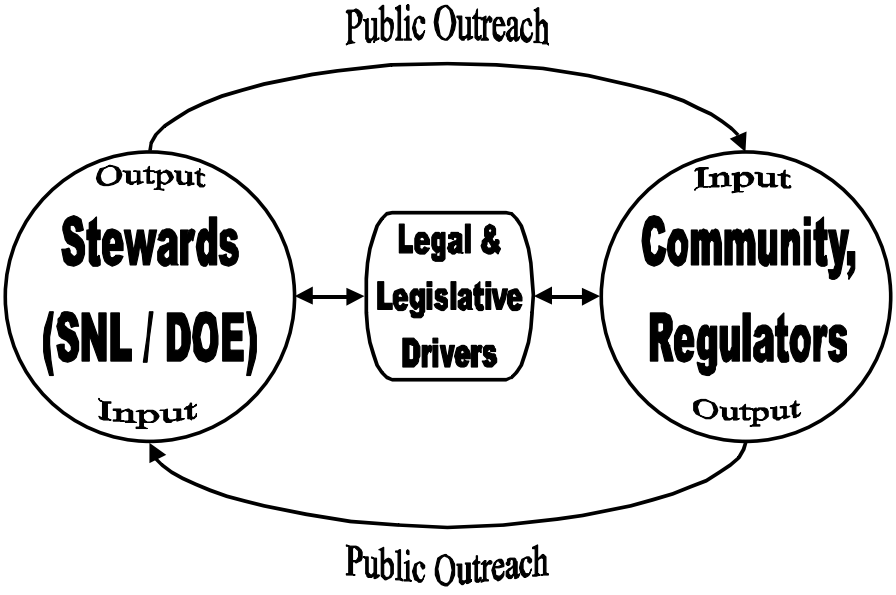
Table 1 is a list of the meetings of this task group. All of these meetings were held at the Community Resources Information Office. Some Stewardship Management Task Group members attended and made presentations at each of the general LTS Plan meetings at the Indian Pueblo Cultural Center. The public was invited to the task group meetings at the general meetings and all of our meetings were open to the public.

Table 1. Meetings of the Stewardship Management Task Group

1 June 2000	2 November 2000
22 June 2000	30 November 2000
13 July 2000	30 January 2001
17 August 2000	22 February 2001
14 September 2000	14 March 2001
5 October 2000	20 March 2001

At our July 13 meeting, we drafted a stewardship model, a simplified representation of what stewardship means, to illustrate the components of stewardship management and their iterative relationships. The model was refined at subsequent meetings. The final version is shown in Figure 1.

Figure 1. Stewardship Model



As indicated in the figure, the Stewardship Management Task Group considers SNL and the DOE to be the primary stewards of the restored environmental waste sites at SNL. They operate under the constraints of legal and legislative drivers, shown in the middle of the figure. They must perform public outreach via reports, media and education to inform the public in the neighboring communities (the stakeholders) and the regulators. The community and the regulators have responsibility for monitoring the stewardship program and providing public outreach to give feedback to the stewards, such as proposed changes to the LTS Plan. The regulators are subject to the legal and legislative drivers. Both the stewards and the community/regulators can influence the legal and legislative drivers, as indicated by the two-headed arrows connecting these three components.

The groups comprising the stewardship model and their roles are described in the following section of this report.

II. STEWARDSHIP RESPONSIBILITIES

Currently DOE and SNL/NM have primary responsibility for stewardship. In the near term we expect that DOE and SNL/NM will continue to be stewards due to obligations in the HSWA permit with NMED. In the long term, if DOE leaves as the primary steward, the community demands that there will be some Federal successor with sufficient funding and legal authority.

Table 2 and Table 3 list the responsibilities of the groups identified in the Stewardship Model (Figure 1). To address how stewardship might be managed in the near term and long term, these tables specify whether the responsibilities are current (C), future (F), or potential (P). During brainstorming sessions, Task Group members had many ideas about how stewardship might be better managed in the future. The task group expressed the value of having independent parties perform some stewardship responsibilities to improve public confidence. Also, the group felt strongly about using an institution with more permanence than DOE such as UNM, museums, the USGS or the City to perform some responsibilities. Most of these institutions are already in the business of information storage, data collection, etc.

The current stewardship responsibilities of DOE include stewardship funding, regulatory interpretation, and enforcing and managing land use. SNL/NM is responsible for implementation of stewardship for DOE, including monitoring, inspections, reporting, and records management. In other words, this task group described the stewards as the doers and the funding people who need to know everything about their sites, including site history and planning for the future.

There are some other government agencies with current stewardship responsibilities of land use, land management, and/or land ownership. At KAFB, landowners include DOE, DoD, and USFS. Adjacent neighbors include Isleta, City of Albuquerque, Bernalillo County, and the State Land Office. ER site location and land ownership is currently tracked by the ER Project and is described in detail by the Institutional Controls and Data Management Task Group.

Table 2, Community and Regulator Roles, lists all the other groups that are not stewards but can have roles in the stewardship process. NMED and EPA are responsible for oversight; setting standards, education, and enforcement. All these groups can assume responsibility through the public outreach process. Outreach is described in more detail in Section V.

Table 2. Stewards' Responsibilities

	Funding	Maintain Sites	Monitor Sites	Land Use Management	Reporting	Records Mgt.	Education Outreach	Regulatory Oversight
DOE*	**C**	**C**	**C**	**C**	**C**	**C**	**C**	
SNL		**C**	**C**	**C**	**C**	**C**		
B. County			**P**	**F**			**P**	
USFS				**C**				
BLM				**C**				
Isleta				**C**				
DoD				**C**			**C**	
Fed-General	**F**	**F**	**F**	**F**	**F**	**F**	**F**	

C = Current role, P = Potential role, F = Future Role

***or Federal successor**

Table 3. Community & Regulatory Roles

	Funding	Maintain Sites	Monitor Sites	Land Use Management	Reporting	Records Mgt.	Education Outreach	Regulatory Oversight
City		**P**	**P**	**P**	**P**	**P**		**P**
State			**C**	**P**				**C**
USEPA			**C**					**C**
University						**P**	**P**	

C = Current role, P = Potential role, F = Future Role

Concerns and recommendations:

- Identifying stewards and their roles was a somewhat confusing process. When one considers 100-year plus time scales, it becomes overwhelming. This Task Group endorsed ideas of breaking stewardship into short-term and long-term time scales and perhaps medium term. The short term would last as long as current HSWA permit obligations hold. The long term is the time scale when it is conceivable that the HSWA permit, institutional controls, or other controlling or regulating factors could be forgotten, lost or fail. Planning is different for these two scenarios: when permits and controls hold and when they fail.

- Tables 2 and 3 should be completed for SNL/NM's Stewardship Plan.

- There was much discussion about what is the best place or group to manage information storage: the Albuquerque museum, UNM libraries, the City, etc. DOE may not be the best information repository. There is concern that without funding and regulatory requirements proper information management will not occur. The SNL/NM Stewardship Plan should address this concern.

- The City and County ought to be engaged in the stewardship planning. DOE and SNL/NM should cultivate the relationship with the City and County.

- The group valued strongly having a more permanent independent institution play a strong role in stewardship.

III. MANAGEMENT STRUCTURE OF STEWARDSHIP PROGRAM

Introduction

This discussion has two aspects. The first is to specify a vision for the attitudes that we hope will drive and guide the management of the stewardship activities. The vision aspect is advanced throughout this text. In publications discussing ways to best manage public programs five strategies are noted as critical to achieving program goals. They are a clear identification of:

- The program core – to help a public program clarify its purpose.
- Consequences – to create rewards for a good organizational performance and penalties for poor performance.
- The customer, in the stewardship case the stakeholders – to make organizations accountable to their constituents.
- Control – to push decision-making power into the hands of managers and employees in order to improve performance and hold them accountable for results. With stewardship the control process must be visible to stakeholders and open to their comments.
- The culture – to change attitudes of public employees, e.g. the behaviors that led to the situations that now require stewardship programs in DOE.

It is important that DOE and SNL work to assure that the Long Term Stewardship programs are planned, executed and administered in keeping with the strategies noted above. Adherence to sound management principles will help meet the challenges of stewardship and aid in identifying and supporting the appropriate roles of DOE and SNL.

The second aspect includes an identification of the organizational components. Clearly stewardship work cannot proceed independent of the practical constraints of all programs, thus:

- The stewardship program and its management must structure itself around the other program elements (funding, drivers, etc) in an organic manner that is dynamically focused both on the EM requirements and our community's concerns (see management model on page ___).
- The stewardship program needs to address cost/schedule/performance issues within the overall context and framework that allows for the program to be adaptive and self-correcting today and in the future.
- The program and its management must work within a structure that allows technical and fiscal requirements to address community concerns and values over time as both the science and our society evolve.

This blending of technical (quantitative) and community (qualitative) perspectives of stewardship will generate better decisions and choices that we can all live with. The organization components that must be aligned in a coherent structure to achieve the stewardship objectives must include functional components and related elements to perform:

- Monitoring – test design, data collection standards, procedures and analysis
- Data Management – defining data structures and access policies, file management criteria, data storage alternatives, update standards
- Outreach – target groups, meeting schedules, criteria for effectiveness
- Assessing Applications and Impacts of New Technology – search and identification practices for alternatives, timing and cost criteria for feasible applications

- Institutional Controls – organization standards for oversight, process visibility, and criteria for accountability.

The process components to support the points noted above include:

- Identifying, specify goals, objectives – include, consider the relevant internal, external environments and circumstances.
- Constructing and assessing alternative programs to meet goals. Select a program.
- Identifying, committing appropriate resources to meet objectives – this includes staff, facilities, time, and relationships/contracts with external entities.
- Developing and evaluating alternative strategies and programs to apply resources to meet goals.
- Creating, identifying, and specifying policies, procedures to monitor program progress and detect exceptions to the program plan process.
- Reassigning resources to correct and/or compensate for exception operations or results to the plan.
- And finally a willingness to correct bad actions and policies while calling attention to the successful participants and processes.

The task is to apply the elements above to the specifics of the Sandia environment and processes. In particular the Sandia stewardship program must not be driven by imperatives set down by DOE headquarters that are not suited to the Sandia situation.

Concerns

The LTS/MGMT work group is concerned that DOE funding constraints and related SNL technical perspectives will solely drive the stewardship program and its management structure. Such a stewardship program would generate decisions and choices over time which only reflect the federal government's need for a "cookie cutter" approach that is easier to administer and fiscally driven. Such a stewardship program would make choices as its completes planned events and overcomes surprise outcomes that are not always in our community's best interest.

Recommendations

In order for the stewardship program to be dynamic, adaptive and self-correcting, the stewardship management framework must not be static or inflexible. It must never be viewed as finished or set in stone instead it must be a vital, open process with a structure that listens and learns from the consequences of its choices.

The stewardship management must include one or more community members that are allowed to fully participate in all decisions and choices, preferably as part of the program's executive group. Community members must be invited to be part of all program elements, such as the NFA's comment process, land fill reviews, ground water monitoring, etc.

The stewardship management must have a fully accessible, open door to all members of our community. The stewardship program must include such elements as:

- CRIO or community centers
- EM visitor centers or museums
- Periodic public outreach meetings
- Other processes or sites that facilitate issue development and resolution, citizen interaction, and work/task groups.

Such processes and sites must eventually become self-funding and self-perpetuating to ensure they outlive the current stewards and any future budgetary constraints.

The stewardship management must have energized and timely feedback mechanisms with a strong focus on community concerns and continuous self-evaluation. This process must be an integral part of all planning, events and oversight and must be open to members of our community, state and local governments, public and private EM work/task groups, etc. This process must be the catalyst for the listening, learning and self-correcting behavior, which should ensure that changing science and community values are factored into all program choices and that the stewardship program evolves into whatever shape and size, is appropriate over time.

We hope that DOE and SNL will work to assure that the Long Term Stewardship programs are planned, executed and administered in keeping with the five strategies noted above. Adherence to sound management principles will help meet the challenges of stewardship and aid in identifying and supporting the appropriate roles of DOE and SNL.

Closing Thoughts

In "Re-inventor's Fieldbook," David Osborne notes five strategies that must be part of any public program. As listed below they help frame the various management points noted above.

- The core – to help a public program clarify its purpose.
- Consequences – to create rewards for a good organizational performance and penalties for poor performance.
- The customer – to make organizations accountable to their constituents.
- Control – to push decision making power into the hands of managers and employees in order to improve performance and hold them accountable for results.
- The culture – to change attitudes of public employees, e.g. the behaviors that led to the situations that now require stewardship programs in DOE.

We hope that DOE and SNL will work to assure that the Long-term Stewardship programs are planned, executed and administered in keeping with the five strategies noted above. Adherence to sound management principles will help meet the challenges of stewardship and aid in identifying and supporting the appropriate roles of DOE and SNL.

IV. POTENTIAL FUNDING SOURCES

Discussion/Background

Success of a Long-term Stewardship program is dependent on a stable source of funding for the activities. The Long-term Stewardship Management Working Group shares the same concerns as participants of Sandia's LTS Stakeholders Meetings regarding continued funding of Sandia's Stewardship Program.

The amount of funding required for Long-term Stewardship (LTS) activities is a fraction of the costs for the Cleanup itself. For example, while over $30 million per year is currently planned to complete the Sandia Environmental Restoration Project, the annual cost of Long-term Stewardship is currently estimated to be less than $2 million per year. However, as many LTS activities are assumed to be required indefinitely, the availability and stability of long-term funding is of concern to stakeholders.

Funding will be needed to support:

- personnel, equipment, and laboratory analysis for monitoring activities
- managing monitoring data and historic information on past corrective action
- regulatory compliance with permits
- outreach and education to citizens
- research and consideration of new technologies
- contingency actions if monitoring indicates a problem

Current Plans for LTS Funding

Funding for DOE Environmental Restoration Projects is provided through annual congressional appropriations resulting from the federal budget process. Each year, the Sandia budget request is forwarded along with the budget requests for the other DOE Albuquerque Operations Office (DOE-AL) sites and programs to DOE Headquarters, and ultimately to Congress. The process introduces uncertainties that form the basis for citizens' concerns.

The DOE Albuquerque Operations Office budget process presently considers Cleanup and LTS needs through the year 2070. The Stewardship Management Working Group understands 2070 represents the limits of the budget planning tool, not a decision to terminate funding. Nevertheless, the uncertainties of the budget process (regardless of how relatively small the future requests are) warrant consideration of alternative funding sources and mechanisms apart from the traditional budget process.

As the working group discussed the short-term and long-term implications of the funding issue, we explored the possibility that DOE (and its contractors) will cease to exist as an entity. As long as a RCRA permit is in place, legal requirements for activities will provide justification for annual budget requests. Should DOE no longer exist, the Air Force will likely be responsible for funding stewardship activities while KAFB is an active base. The issue is compounded if KAFB closes.

Similarly, the LTS Institutional Controls/Information Management Working Group identified approximately 30 Sandia Environmental Restoration sites cleaned up to restricted land use (recreational or industrial) for which DOE has no lease agreement with the Air Force. These scenarios call for close cooperation with the Air Force. We suggest active negotiations begin now to clarify arrangements and prepare for such an eventuality.

Alternative Potential Funding Sources

The working group identified several other federal and non-federal agencies that may be potential sources of stewardship funding. The working group recognized that in general, funding sources other than DOE could provide only limited funding for specific activities or studies. Funds from some of the potential sources would support that entity's potential role in stewardship activities (See Section II, "Stewards and Roles"). Potential federal sources are also subject to annual appropriations from Congress.

Other federal agencies include:

AGENCY	FUNDING FOCUS
Department of Defense (as landowner)	Land use controls, Monitoring, Maintenance
Department of Interior (as landowner)	Land use controls, Monitoring, Maintenance
Forest Service (as landowner)	Land use controls, Monitoring, Maintenance
Environmental Protection Agency	Monitoring
Geological Survey	Monitoring (data collection)
Bureau of Indian Affairs	Monitoring
Centers for Disease Control	Risk evaluation & Outreach/Education
National Institutes of Health	Risk evaluation & Outreach/Education
National Science Foundation	Outreach/Education
Dept of Health and Human Services	Risk evaluation

Non-federal agencies include:

AGENCY	FUNDING FOCUS
City and/or County	Land use controls & Monitoring
State of New Mexico	Monitoring
Public Lands Fund	Education
Private grants	Various

Alternative Funding Mechanisms

Many citizens have suggested that a dedicated funding source be established for continued care at DOE sites. The full faith and credit of the US Government does not completely satisfy our concerns. Trust funds are now being studied by the Department of Energy as a mechanism for funding stewardship. We encourage the implementation of that type of mechanism at Sandia.

Recommendations for the SNL Long-term Stewardship Plan

- Establish a stable funding commitment from DOE HQ or federal successor (at a minimum)
- Establish a dedicated funding source, e.g., trust fund
- Budget for contingencies above the costs of regular maintenance and monitoring activities
- State clear commitment to budget planning beyond 2070
- Define funding responsibility for sites that have no lease from the Air Force

V. OUTREACH

Introduction/Background/Discussion

The basic premise of outreach is for stewards to maintain relationships with the Stakeholders. These relationships need to be accessible, consistent, on-going, robust, and responsive to deal with changing concerns. Stewards must listen to the public as well as share information.

Concerns

Stewardship outreach is charged with finding out what information the public needs and then addressing it. Stewardship outreach should not be limited to just this and the next generation. Information about stewardship must not be forgotten so outreach must be publicly present at all times on a regular basis. Stewardship outreach needs to address evolving communication and information technologies. Stewardship outreach must not concentrate on one particular remediation site.

As public acceptance of the long-term stewardship process is vital to the success of the project, dedicated outreach funding must be identified. This will ensure that not only DOE/SNL or succeeding entities, but also the general public has ownership of and feels responsible to the stewardship process. In an effort to ensure that the public has trust in the stewardship outreach group, the outreach group must be open, evolving and composed of many differing viewpoints.

Recommendations

In an effort to ensure that the public voice is heard and that all needs are considered during the stewardship process, the long-term stewardship management working group recommends the following:

1. Establish a stewardship outreach working group composed of the general public and other interested parties. This group would be responsible for physically interacting with the general public and SNL/DOE on stewardship issues. This would also provide a place for the public to present concerns.

2. Establish a multidisciplinary advisory panel to ensure that uniform/relevant information is being presented to the public and to advise the outreach working group. This should include representation from among the following areas: the public, academicians, scientists (nuclear, chemical, electrical, computer, mechanical, etc), risk analysis experts, historians, anthropologists, community health experts, land use planners, water resources experts, hydrologists, geologists, economists, and non-governmental organizations.

3. This advisory panel will develop a presentation that will address the following areas which will be presented by the outreach working group:
    - historical perspectives including the history of remediation of the ER project and US' transition from a defense based nuclear power to a non-defense based nuclear power
    - What's there - the SCIENCE behind it
    - relative/perceived risk
    - community/personal/employee health and safety
    - land use
    - encroachment of population
    - water quality/quantity

- air quality
- geology
- economics
- regulations
- transportation of waste
- evolving technologies

4. Informational presentations for the general public should have multiple modes of delivery, including, but not limited to:
    - Community Resource Information Office (CRIO or its successor facility) will be involved and will maintain an office for the duration of stewardship
    - Multi-media presentations to community groups
    - A general presentation that will be used in schools and communities which includes basic radiation education, hazardous materials issues and how they differ from radiation issues and a description of the stewardship process including roles, responsibilities and public impact
    - The following criteria should govern the presentation:
        - It will be factual and user-friendly.
        - Must be written in a language that the average citizen can understand.
        - The presentation should be reviewed at least periodically to include evolving, relevant information.
    - Creation of relevant Informational Bulletins as needed - at least quarterly
    - Coordinating public tours of the remediation sites - at least twice a year
    - Creation of a permanent display at the National Atomic Museum
    - Creation of a traveling display for other interested museums
    - Create and maintain a speaker's bureau
    - Create and maintain a repository of pertinent evaluative data that is easily accessible to the public
    - Establish an interactive website which will be available to the community:
        - List tour schedules, presentations, workshops.
        - Have an outline of the stewardship presentation
        - List links to resources for further information related to stewardship and radiation education
        - List of contact information for the outreach group
        - Establish the means by which the public can post comments/questions.
        - Answers should be posted on the website as a means of encouraging public participation.
        - List the history and location of each "stewardship" site which also contains the pure data of each site in text format.

5. The impact of remediation on the general public must be taken into consideration so that it negatively affects the least amount of people and land area.

VI. LEGAL AND LEGISLATIVE DRIVERS

Discussion/Background

Questions regarding the requirements that will drive long-term stewardship of Environmental Restoration sites arose during the deliberations of the LTS Management Task Group and the larger public meetings/workshops held at the Indian Pueblo Cultural Center. Many Environmental Restoration sites will not be cleaned up to levels allowing unrestricted (residential) use. What requires Sandia to perform the necessary activities that will protect human health and the environment into the future?

A National Pollutant Discharge Elimination System permit issued by USEPA requires storm water monitoring. Storm water samples can detect impacts to surface water that may occur due to erosion at Environmental Restoration sites.

The New Mexico Environment Department administers regulations for the protection of groundwater quality. Currently, regulation of groundwater quality as it relates to the SNL/NM Environmental Restoration program is deferred to the Resource Conservation and Recovery Act (RCRA) permit. This permit provides the requirements for the investigation and ultimate levels of cleanup at Environmental Restoration sites.

The existing RCRA permit administered by the New Mexico Environment Department can be the legal driver to require:

- Erosion control inspections and maintenance
- Landfill cover inspections and maintenance
- Ground water and vadose zone monitoring
- Contingencies for additional cleanup due to changing conditions

To demonstrate commitment that these activities will be accomplished, SNL/NM should request a modification of the RCRA permit that specifies the requirements. The Long-Term Stewardship Plan could be made part of the permit.

Concerns

The task group considered the possibility that the RCRA permit might be terminated at some point in the future due to closure of the Air Force Base or shut down of SNL/NM. By formalizing LTS activities as RCRA permit requirements, the transfer of responsibility would be clearer.

Citizens are concerned that maintaining land use controls at Environmental Restoration sites with residual contamination will be difficult. Using the existing RCRA permit to enforce land use controls is not the most effective mechanism. The task group feels that legislation assigning enforcement authority through the State of New Mexico to local government should be sought.

In the absence of legally enforceable land use controls, SNL/NM should explain in the plan how its existing internal property management process functions to instill confidence that land use restrictions are maintained. Further, SNL/NM should actively engage the Bernalillo County Clerk's Office and City of Albuquerque Planning Department to formulate a process for transferring the property tracking authority at some future date.

Recommendations for the SNL/NM Long-Term Stewardship Plan

- Request RCRA permit modification that clarifies LTS activities as permit requirements, and assures tracking and land use controls for industrial and recreational use sites

- Support legislation to provide state or local government authority to enforce land use restrictions

- Actively collaborate with the appropriate City/County organization to develop land use tracking mechanism

- Describe the existing SNL/NM internal property management system

- Devote a section of the plan to explain existing legal drivers that require long-term stewardship activities

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APPENDIX D
Institutional Controls and Information Management Task Group
Input to Department of Energy (DOE) and
Sandia National Laboratories/New Mexico (Sandia/NM)
Long-Term Stewardship (LTS) Plan
June 2001

The following stakeholders were members of the Long-Term Stewardship Information & Institutional Controls Task Group and participated in the development of this report for the DOE/Sandia National Laboratories Long-Term Stewardship program.

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March 14, 2001

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FIGURES

Figure 1 Stewardship Values

Institutional Controls and Information Management Task Group
Input to Department of Energy (DOE) and Sandia National Laboratories (Sandia/NM)
Long-Term Stewardship (LTS) Plan
June 2001

Draft - Final Report

Our Challenge

Today, we feel more interconnected with all species and the earth. But, we are also of a generation of people, (whose democratic government) has chosen to bury toxic waste in the earth, potentially affecting our soil, our water, and the quality of life of future generations of human and non-human species. What the Department of Energy and Sandia National Laboratories does from now on will have an effect on us the citizens and ultimately it is the citizens that will have to pay (finance?) for this the long term stewardship (LTS) program.

There are ethical issues to be considered. Do we have a right as human beings to contaminate the earth and pass the contamination to future generations?

LTS should become a part of RCRA

As members of the Institutional Control and Information Management Task Group, in order to provide our community with the desired level of environmental protection now and in the future, we must incorporate the LTS program into the State of New Mexico Resource Conservation Recovery Act (RCRA) Permit. Without a legal mandate, it is unlikely that DOE will be successful in obtaining annual funding for an LTS program into the future. As our Presidents and their administrations have vastly different values and interests in LTS, and as the residents of the Albuquerque area will come and go, we choose this strategy-incorporation in the RCRA Permit-as the most viable and effective for protection of ourselves and the generations to come.

Create meaningful and effective involvement of citizens and the community

Equally important for the LTS program to remain viable, the advice and energy of citizens and the community must be utilized, and mobilized. Built into the LTS Program must be a systematic way of calling the public's attention to critical juncture points – yearly reporting requirements, risk levels that are exceeded, repeated events of non-compliance at which time citizen involvement and community involvement is called upon to remedy the situation. As community values and attitudes change, the LTS program must be flexible enough to incorporate these changes.

STEWARDSHIP CONSIDERATIONS:

1. What is Long Term Stewardship - a working definition

Ongoing acceptance of the responsibility and the implementation of activities and processes necessary to maintain and monitor long-term protection of human health and of the environment from hazards posed by residual radioactive and chemically hazardous materials and wastes.

2. Who are the stewards?

Currently, BLM, DOE, USFS, BIA, SNL, KAFB and NMED are the legal stewards and owners of the land on which the sites exist.

- Those affected by the current stewards' decisions such as all citizens of New Mexico (and at the macro level, the citizens of the world). Our stakeholders may at some time become stewards.
- Future stewards could include local governments that may inherit the land in the future and take responsibility for long term stewardship. These may be Bernalillo County, the City of Albuquerque, the Isleta Pueblo, private companies or individuals or others.

3. What will the stewards do?

Stewards are responsible for a wide variety of functions that include surveillance, monitoring maintenance, information management, public affairs, institutional controls, physical controls, research, and interaction with other stewards. Stewards must work as partners with the public.

- For example, stewards may revisit residual contamination at some sites.
- They will provide information about the condition and the need for action to the public.
- There may be future potential for recycling at some sites.
- LTS is a process that occurs when cleanup is completed and in passive states, when clean up is not active.

4. How will Stewardship be funded for the long term?

We recognize that DOE has the immediate responsibility for funding LTS. Our concern is that over the long term, DOE may cease to exist as we know it, and funding may not be readily available to maintain any stewardship commitments.

- We recommend that the DOE establish a trust fund for the long- term financial stability of stewardship at Sandia National Laboratories.
- Using the example of the Social Security Act, we suggest that the trust fund be secured and not be reliant on annual Congressional appropriations or political contingencies.

5. What are the conditions of stewardship?

- Stewardship needs “teeth.” There should be legal restrictions and enforceability that is clear to the public. As mentioned above, incorporation of LTS into Sandia’s RCRA Permit is currently the best method to create a legal mandate. The public’s responsibilities are for the process and rules for maintaining stewardship, not for the residual waste. Stewardship must not be lip service or based on taking credit for actions that would occur even without stewardship.

- Stewardship must be “self maintaining” and not become an “8 track tape” or obsolete approach. It should also be "self-perpetuating; self-correcting; self-funding and self-terminating." (What we mean to say is that the resources and people must be made available that will allow the stewardship program to react to changing environmental, political, or administrative conditions?)

- It has a timeframe. While the RCRA Permit is enforceable and alive, we can mandate and manage stewardship activities under the Permit as “Near Term Stewardship.” A “Long Term Stewardship” program is implemented when the RCRA Permit is no longer an active legal document.

- ***IT MUST HAVE AN ALARM SYSTEM***. When a default or change in plans occurs, an alarm system would send messages to stewards and stakeholders. How do we assure that the community gets good information in a timely fashion that catalyzes controls.

- There must be an information base, which is frequently updated and accessible in many ways and in many forms to the public.

- The New Mexico Environment Department should provide an active and on-going oversight function to ensure environmental surveillance milestones and activities are completed according to plan.

- It is important that there is ongoing local public influence and participation during Sandia's stewardship program. Long-term reliance on state and federal agencies to effectively appreciate and respond to local concerns seems unwise. The need for public understanding and attention to long-term stewardship warrants the establishment of a stewardship citizen's board.

This graphic of the Information Management/Institutional Controls Stewardship Values was developed as a way for this task group to show the interconnected relationships between the Legal/Regulatory framework, funding mechanisms, community involvement and advances in technology.

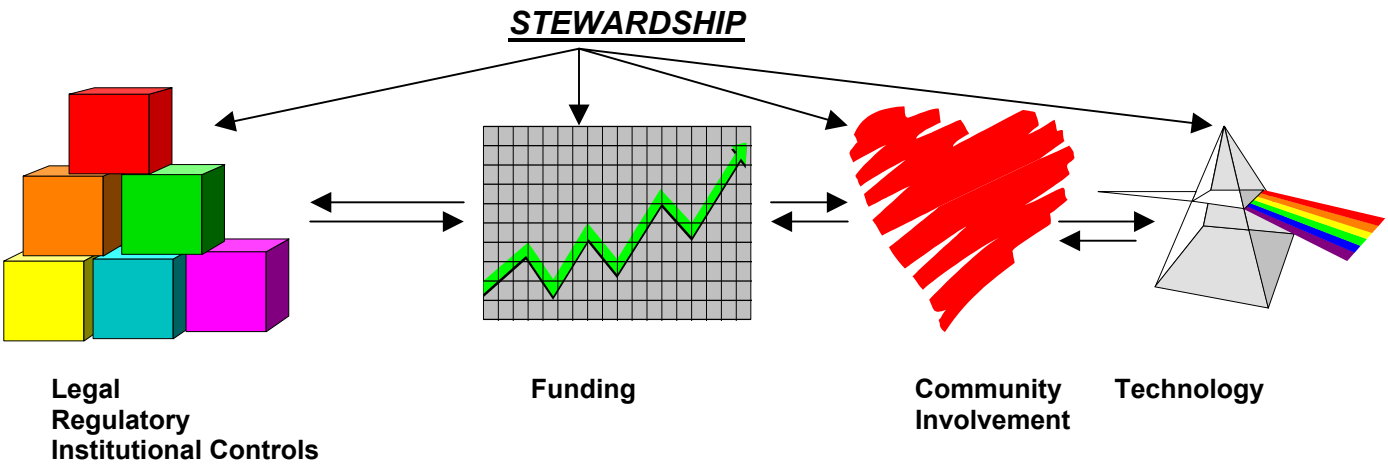


Figure 1 Stewardship Values

- Each of these four areas requires unique information for management/tracking

Some guiding principles about information:

- ***INFORMATION MUST BE UNDERSTANDABLE*** (Litmus test: be able to explain to your spouse)
- Information must inspire confidence and trust
- Information must be available in different forms for different users (reports, placards, videos, computers, signage, symbols and possibly a 3D model of sites)
- Information must be stored in a variety of public places (kiosks, public libraries, websites, telephone hot lines, DOE banks, archives)
- Information should create a sense of urgency and raise a red flag using some symbol and other visual designs as a way to preserve long-term memory of the sites and what is in them.
- Information must be timely and a system of updating must be used
- Information could be displayed as a check-list for stewardship activities as a way of ensuring that LTS commitments are being met

Sandia and DOE would need to create an LTS program that can anticipate the future when one of the following conditions prevails:

- When there is no permit
- When the land contaminants change
- When land ownership changes
- When zoning regulations change
- When the President or Congress runs out of interest and/or funds
- When there are unintended consequences
- When once cleaned (2001), is later to be found contaminated (2016)

INFORMATION MANAGEMENT TOOLS AND TECHNIQUES

1. What is Information Management?

Information management is the tools and techniques used to manage all the different types of information about the sites entering into long-term stewardship. This would include paper documents, electronic documents, maps, sampling records, records of public interactions, etc.

2. What kind of information do we need?

- Information about the remaining health and safety risk at sites,
- Residual level of contaminants,
- Monitoring data,
- Engineering controls, and
- institutional controls

This information should be made available to affected governments and the public in a variety of formats and levels of detail so that individuals are able to use the information to inform themselves at whatever level of specificity or technical sophistication they desire.

Information should be available in the form of:

- Maps
- Fact Sheets
- Graphic representation
- Complete technical reports
- Progress Reports
- Monitoring reports
- Internet access points – to various linked information sites on stewardship
- Symbols
- Placards
- 3-D models
- Textbooks for all levels of education

Because the public does not differentiate between Kirtland Air Force Base and Sandia, information portals of all types should include stewardship information for both DOD and DOE properties. The LTS Program must be able adapt to information technology changes.

3. How will the information system be self-justifying over time to keep the data alive, timely, and easy to access?

This task group was concerned that unless a solid community-based reason for keeping this data is perpetuated, this information management system, would loose its reason for existence, and

end up dying of neglect. To help ensure perpetuity, information management requirements should become part of the RCRA Permit conditions.

4. Where is the information to be located?

- An internet website designed and managed as a stewardship information resource
- Kept on site - or in close proximity to the site and be made available to the public
- Within the community –
  - Museums – have a history of keeping information accessible
  - Public reading rooms – i.e. in a storefront reading room in a mall not just at a library
  - University archives
  - Public libraries

- Site-specific records also in a national archive

- In our local Native American Pueblos. The Pueblos have been here much longer than SNL/DOE. They need to help us remember the stewardship sites.

- In local governments to link DOE environmental contamination information into the local GIS and record-keeping systems.

- Artistic creativity is an essential component for community "remembering." In all cultures where ideas/issues/locations are passed on through the generations, some type of artistic creation is used a memory device. Stories, paintings, sculpture, renderings, etc., all help the "collective memory" remember.

5. What about outreach to the public?

The overall consensus is that we need to do more outreach to get additional community members participating in LTS.

Some suggestions are to contact:

- Public Officials in Bernalillo, Sandoval, Valencia Counties
- Public Officials in the City of Albuquerque, Rio Rancho
- Public Officials at Isleta Pueblo
- NM Board of Realtors
- NM Council of Churches
- Educational Community
- Chamber of Commerce
- Health practitioners
- Neighborhood Groups, particularly in the San Jose/South Valley corridor.
- Kirtland Air Force Base Officials
- Children, the next generation!
- Peace and Justice Center
- Citizen Action groups

An informed community is better able to act and react to situations involving the sites under stewardship.

Citizens and non-governmental organizations should be encouraged and funded to monitor and enforce long-term stewardship commitments. Members of the public and non-governmental organizations can be effective supplements to governments' monitoring and enforcement programs.

6. What about Education?

Stewards are developed over time. In order to keep the idea of stewardship alive we must start educating our public about the long-term impacts of stewardship (especially if stewardship were to be abandoned). Education should include information about the potential risks posed by residual contamination and about methods of avoiding those risks, including compliance with institutional controls. Institutional controls and long-term stewardship depend to a certain extent on individuals knowing about land-use restrictions, warnings and risks. The better educated the affected public is about these restrictions, the more likely they are to avoid the risk.

We would like the DOE to consider these areas for educational outreach:

- Modules on stewardship in the Albuquerque Public School curriculum
- A university-based program on stewardship
- The development of a DOE course on environmental stewardship as part of the DOE Nuclear Weapons School
- Providing information and briefings to any community group
- Giving tours of the toxic waste sites
- Distribution of a Community Check list
- Articles in newspapers, bulletins on radio and TV

7. What would be included in a Community “Checklist”?

One way of instilling confidence that Stewardship is working, is the development of a "Community Checklist", to serve as a “report card” on stewardship activities. This checklist would be one way the public could determine if DOE’s commitments to stewardship are being met. Below is a sampling of the types of questions such a check- list may have:

- In this year did DOE fund Stewardship adequately?
- Are all the monitoring programs adequately funded so that the goals for monitoring are met?
- What were DOE’s stewardship education goals for this year?
- Were they met? Notate the goals.
- What did DOE do for community outreach with regards to stewardship this year? List examples.
- Which sites were monitored? What were they monitored for?
- Where is the monitoring report?
- Are the physical barriers still in place
- Has the signs at each site been checked? Have any been replaced?
- What was placed at the public reading rooms? Museums?
- Is the Internet access point kept up to date?
- Is DOE keeping statistics on information use – to determine if the “right types” of information is available to the public?
- What aspect(s) of Stewardship are DOE out of compliance on? Have they created a “corrective action plan" to eliminate the non-compliance?
- What else is needed?

INSTITUTIONAL CONTROLS: TOOLS AND TECHNIQUES

1. What are Institutional Controls?

An institutional control is a legal or institutional mechanism that limits access to or the use of property or warns of a hazard. And institutional control can be imposed by the property owner, such as use restrictions contained in a deed or by a government, such as a zoning restriction.

Signs are not considered to be an institutional control, but are a physical control used as part of a developed institutional control.

Although this Task Group recognizes that Sandia is located on KAFB which is federal property, we are concerned about land transfers in the future to other governments or private concerns, and about the viability of institutional controls relying on record keeping of land use.

We have created a proto type "Community Checklist" of the types of activities that we, the public, would like incorporated into the LTS Plan. We must be assured that the institutional controls put into place at DOE/Sandia will help us maintain confidence that the ICs are working and remain appropriate for a given site.

2. What would a "Community Checklist" for Institutional Controls look like?

- Demonstrate compliance with regulatory requirements and track required activity milestones
- Monitor for public safety
- Ensure restrictions are transferred with land ownership change
- Prevent physical access to sites
- Prevent intrusion to physical barriers Prevent compromise of barriers
- Avoid exposure short term/long term
- Avoid creating an alternative pathway for migration of contaminants to receptors
- Limit uses to those compatible with future use designation
- Limit exposures
- Limit liability by controlling materials used on site
- Manage the use of groundwater as appropriate
- Keeping stake holders informed
- Planned and predictable stakeholder/manager information exchange
- Capture appropriate Characteristics of specific sites
- Monitor the appropriateness of the chosen institutional control for each specific site

3. What is DOE/Sandia going to do with the land permit status as part of LTS?

The land status of the (29?) Un-permitted ER Sites on KAFB Land must be resolved as part of the SNL stewardship program.

4. What types of information management will be needed for Institutional Controls?

- Establish information categories to help drive the institutional controls process

- Look at each site, or similar group of sites, and recommend institutional controls. At the same time make notes on the information requirements of these sites.

5. We determined that Sandia has 3 categories of sites:

1. ***High profiles sites*** – CWL, MWL, CAMU -- these will have the most attention

2. ***Potential to slip through the crack sites*** – sites not cleaned up to background, but still a hazard, but are not "glamorous" enough to warrant much public attention. These sites concerned this task group the most because they could easily be forgotten over time.

3. ***The Non-issue sites*** – the sites that have been cleaned up to background and no residual contamination remains. They currently have no further action (NFA) status on the HSWA Permit.

We noted that the signed and fenced and signed sites should not be neglected—these sites in the future could be potentially used and must not be forgotten because they are most likely to be re-used by someone else in the future.

APPENDIX E
Task Group Biographical Sketches

Task Group
Biographical Sketches

Chris Campbell
Chris manages the Waste Environmental Research Consortium Pollution Prevention Technical Resources Center and served on the DOE/Sandia National Laboratories Citizens' Advisory Board for one year. He has lived in Albuquerque since 1997 and worked for the Rhode Island Department of Environmental Management for 16 years. He served for 2 years in Hungary as an environmental volunteer in the Peace Corps. His expertise is in water resources, pollution prevention and Community development.

Paul A. Catacosinos
Paul is a member of the Albuquerque Geological Society. He retired in 1995 from a teaching position in Michigan. As a professor emeritus in geology, he continues to be interested in environmental remediation issues.

Lois Chemistruck
Lois has been a member of the Albuquerque community for more than 50 years. She has been a realtor for over 30 years and was at one time the President for the Royal Heights Neighborhood Association. Lois volunteered to work on this task group because she is particularly concerned that the water in Albuquerque is safe to drink and that the land remains safe to build on, whether it is homes or businesses.

Jens Deichmann
Jens works for the New Mexico State Land Office. He has been a member of the community for 30 years. He is interested in Long-Term Stewardship because of the proximity of Kirtland Air Force Base to state trust land. Jens has a scientific and academic background and has worked as an environmental consultant in areas of hazardous waste contamination.

Dianne Duncan
Dianne is an environmental geologist and works for Sandia National Laboratories' Environmental Management Department. She has been a resident of Albuquerque since 1990. Her background is in environmental monitoring and she is a member of this task group because she is interested in ensuring a clean environment for the future. Dianne is also responsible for writing Sandia's Site Environmental Report and edits Sandia's Site-wide Groundwater Report.

Doug Earp
Doug is a geohydrologist with more than 20 years experience, including 14 years with the Albuquerque Environmental Health Department. Doug has been involved in development and implementation of City ground-water protection programs and is responsible for the City's regional ground-water monitoring program and site-specific monitoring at 9 former City landfills. He is also managing a contract to remediate ground-water contamination at the former Los Angeles landfill. Doug is a native New Mexican.

John Gould
John is an environmental scientist and geologist with 17 years of experience in environmental work. John currently manages the Environmental Restoration Program for DOE's Kirtland Area Office. He has also managed Kirtland Air Force Base's Installation Restoration Program, and worked for both the Surface Water and Hazardous Waste Bureaus of the New Mexico Environment Department.

Mark Holmes
Mark is a project manager for the Installation Restoration Program at Kirtland Air Force Base. The program identifies, investigates and remediates past and present areas of contamination. He has been a resident of New Mexico for 20 years. KAFB is interested in SNL's approach to long-term stewardship because KAFB is also in the process of planning for the long-term monitoring at sites where contamination will remain after restoration.

Franz Lauffer
Franz is a hydrogeologist at Sandia National Laboratories and the project leader for its Groundwater Protection Division. He has been a resident of New Mexico for 17 years. Franz is interested in Long-Term Stewardship issues at the Lab because his staff would be responsible for implementing the groundwater monitoring aspects of the plan.

William S. McDonald
Bill has a background in Water Resources Management, Geology, and Civil Engineering and has worked for the New Mexico Environment Department for the past 11 years. He has spent the last 10 of these years independently investigating groundwater concerns at or near DOE facilities on KAFB and reviewing Sandia National Laboratories' Environmental Restoration Project proposals for No Further Action to assure that regulatory compliance, cleanup goals, and appropriate risk levels are met. Before going to work for the NMED, William was an oil and gas exploration consultant throughout the Rocky Mountain area.

Tami Moore
Tami is a public affairs specialist for the Department of Energy's Kirtland Area Office. She is also involved with many of DOE's public participation activities and has served as the facilitator for this task group. She has been a member of the Albuquerque community for nearly 17 years.

Hans Oldewage
Hans is a health physicist with Sandia National Laboratories' Environmental Management Department. He chose to participate on this task group because he felt he could contribute to the report in the areas of environmental surveillance. Hans will also be partly responsible for implementing the recommendations made by the task group.

Jerry Peace
Jerry is a geologist, geophysicist, and civil engineer for Sandia National Laboratories. He works in the energy and environment division and is responsible for the Mixed Waste Landfill. His diverse background includes environmental, geoscience and engineering experience. He is an avid outdoors enthusiast and has been a member of the community since 1982.

Jerry served as this group's Task Group Leader.

Edward D. Vigil
Ed is an environmental specialist for the New Mexico Environment Department's DOE Oversight Bureau. He is responsible for the oversight of Sandia

National Laboratories environmental monitoring programs. He has been a member of the Albuquerque community for the past 10 years.

Lance Voss
Lance is a member of the New Mexico Environment Department's DOE Oversight Bureau. He has been a resident of Albuquerque for 6 years. He has 15 years of professional experience as an environmental scientist performing site remediation, characterization and assessment of RCRA/CERCLA sites. He has worked at several DOE sites including the Savannah River Site, Los Alamos National Laboratory, the Pantex Plant, and Sandia National Laboratories.

Long-Term Environmental Stewardship Management Task Group
Biographical Sketches

Gary Yeager
Gary is a native of New Mexico who has recently retired from Sandia National Laboratories. For the past 13 years at SNL has been involved in assuring that SNL is operated in compliance with applicable Federal, State, and Local environmental requirements. Relevant education includes a BS, MS, and PhD. in Biology.

Will Hoffman
Will integrated Waste Management & Pollution Prevention; City of Albuquerque Solid Waste Management Department, Central Services; member, Earth Day Coalition of NM, Environmental Education Assn. of NM, Shared Vision Inc, Albuquerque's Environmental Story, Open Space Alliance, New Mexico Conference of Churches, Eco-Justice & Climate Change.

Roger Kennett
Participated on the LTS Management Task Group as a representative of NMED and a concerned resident of Albuquerque. A geologist by training, he has worked as an environmental professional for 20 years.

Robert Long Jr.
Robert is a member of the SNL/AL Citizens' Advisory Board in 1999-2000 and has been involved with Long Term Stewardship planning for the SNL/AL environmental restoration sites since June 2000. He holds a Ph.D. in physics and is retired from Science Applications International Corporation, where he performed a variety of aerospace studies and analyses. He continues to work for the same company as a consultant employee as needed.

JoAnne Ramponi
JoAnne served on the DOE/Sandia National Laboratories Citizens' Advisory Board as the representative for the League of Women Voters Albuquerque/ Bernalillo County. Have also been active in land use, water, and air quality issues for over fifteen years in Albuquerque/Bernalillo County.

Diane Terry
Diane served as a member for 4 years on the DOE/Sandia National Laboratories Citizens' Advisory Board. Background: Elementary education, neighborhood Association and legal Studies.

Debra Thrall
Debra is the Professional Development Coordinator for WERC, a consortium for environmental education and technology development. She has been involved with nuclear education outreach for 10 years having previously worked with Los Alamos National Labs in the development of a radiation curriculum called SWOOPE. She has taught chemistry, physics, biology, geology, and other sciences in public and private high schools in New Mexico and Oklahoma for 18 years. Debra has served on the board of the Environmental Education Association of New Mexico for the past 5 years and currently serves as an adjunct professor of environmental education at the University of New Mexico.

Ted Truske
Ted came to Albuquerque 30 years ago to identify alternative uses for Sandia's atmospheric nuclear test system. That work raised questions about Sandia's practices and nuclear weapons programs. The stewardship products of those programs are critical to our community so he appreciates working with others developing recommendations for Sandia's stewardship work.

Ted Wolff
Ted is a technical senior staff member of Sandia National Laboratories. He is a member of Sandia's Community Outreach Office, which he joined in the fall of 1997. He has an extensive background in environmental assessment including public involvement activities. In his current job, he is involved in a number of governmental, environmental, and educational outreach activities. His public involvement activities include chairing, facilitating, and coordinating committees.

Institutional Controls and Information Management Task Group
Biographical Sketches

Rich Kilbury

Rich is an environmental specialist for the New Mexico Environment Department's DOE Oversight Bureau. Mr. Kilbury's experience includes working on environmental problems at numerous DOE facilities and weapons plants across the nation. He holds an MS in hydrology from the University of Arizona and believes that a regulatory driver is important to ensure funding and the future success of site stewardship at Sandia.

Craig Richards

Craig has lived in Albuquerque since 1982. Craig retired from evaluating federal government programs in 1995. His evaluation experiences included many DOE and Sandia programs. Craig has natural resources and MBA degrees. He advocates responsible stewardship of all natural resources and that a successful stewardship program requires continuous citizen participation as an equal partner.

Dorie Bunting

Dorie has lived in Albuquerque for 50 years. She has been a peace, anti-nuclear, human rights activist for most of that time. She was a founding member of the Albuquerque Center for Peace and Justice. Even though an opponent of nuclear weapons, energy, etc., as a citizen of the U.S. she feels a responsibility for the care of the toxic residue from those activities.

Maggie Seeley

Maggie is the fortunate facilitator for the Long Term Stewardship process. She is an ardent environmentalist and global citizen, who works in Africa and Bangladesh on economic incentives for sustainability. Maggie teaches management and organizational behavior at UNM and uses the Triple Bottom Line -- people, the planet and profit -- as her primary methodology.

Will Keener

Will is the public participation task leader for the Sandia Environmental Restoration Project. He has lived in Albuquerque for 13 years. He holds degrees in communications and earth science. Among his community projects are Boy Scouts, Girl Scouts, Youth Soccer, Leadership Albuquerque, the Albuquerque Museum, and the Albuquerque Geologic Society.

Denise Bleakly

Denise has lived in Albuquerque for the last 17 years and has been involved in Sandia's ER Project for the last decade. She is responsible for the Environmental Geographic Information System (EGIS) and has developed data bases to track the history of the ER Sites at Sandia.

Ted Truske

Ted came to Albuquerque 30 years ago to identify alternative uses for Sandia's atmospheric nuclear test system. That work raised questions about Sandia's practices and nuclear weapons programs. The stewardship products of those programs are critical to our community so he appreciates working with others developing recommendations for Sandia's stewardship work.

Beth Oms

Beth is the Environmental Restoration/ Waste Management Team Leader at the Kirtland Area Office, Department of Energy, Albuquerque, NM. She earned Bachelor's of Science degrees in Civil and Geological Engineering at New Mexico State University and has more than 17 years of experience in project management, environmental and civil projects; 11 years with DoD and the past six years with the DOE

APPENDIX F
Sandia ES&H Manual, Chapter 10, Section 10N

*SECTION 10N - DISCOVERING AND REPORTING A POTENTIAL PAST WASTE RELEASE SITE

Subject Matter Expert: Denise Bleakly; CA Counterpart: Steven Orth
MN471001, Issue C
Revision Date: January 15, 1998, Replaces Document Dated: July 31, 1995

- *Applicability
- Discovery of a Potential Past Waste Release Site
- Reporting of a Potential Past Waste Release Site
- *References
- Attachments
  - *10N-1 - Sample Report of a Potential Past Waste Release Site at SNL/NM Form (Word file/Acrobat file)
- Forms
  - SF 2001-QC, SNL ES&H Question/Concern Form (Word file/Acrobat file)

* Indicates a substantive change
** Indicates a substantive addition

*APPLICABILITY

This section applies to SNL personnel who conduct outdoor activities on Sandia-controlled premises at or below ground level that may produce hazardous, radioactive, or mixed waste contaminants.

DISCOVERY OF A POTENTIAL PAST WASTE RELEASE SITE

Guidance

Managers should:

- Encourage all SNL personnel who have knowledge about potential past waste release sites to come forward with that information.

- Review reports of potential past waste release sites with respect for the reporting person's wishes concerning anonymity.

SNL personnel should:

- Be aware that any place where SNL has conducted operations in the past is a potential past waste release site. Examples of ways potential past waste release sites could be found include the following:

    - Routine plant maintenance operations

    - Construction activities for specific SNL operations

    - Routine inspection of property or testing areas

    - Discussions with retirees

    - Close-out interviews with SNL personnel leaving SNL

- Make verbal or written reports of potential past waste release sites as soon as they are suspected or discovered (see "REPORTING OF A POTENTIAL PAST WASTE RELEASE SITE" for more information).

SNL personnel who wish to report a potential past waste release site may remain anonymous if desired (see "REPORTING OF A POTENTIAL PAST WASTE RELEASE SITE" for more information).

REPORTING OF A POTENTIAL PAST WASTE RELEASE SITE

Guidance

SNL personnel may report a potential past waste release site using the following methods:

Method	Action
Verbal	To report a waste release site discovered during field work at SNL/NM:

	1. Call the Non-Emergency Hotline (311 or 844-6515). 2. Tell the operator about the discovery. 3. Wait to hear from the ER site information contact. 4. Answer the ER site information contact's questions concerning the site to initiate the internal ER project process for developing a waste release site report. 5. To report a discovery of a waste release site made during records searches, discussions with co-workers, or interviews at SNL/NM, contact the ER site information contact or call the Non-Emergency Hotline (311 or 844-6515). At SNL/CA, call the ER site information contact or call the ES&H Non-Emergency Hotline at 294-3724 to report any discovery of waste release site.
Written	Contact the ER site information contact to obtain a Report of a Potential Past Waste Release Site at SNL/NM Form (see Attachment 10N-1 (Word file/Acrobat file) for a sample).
Anonymous	Complete an SNL ES&H Question/Concern Form (SF 2001-QC [Word file/Acrobat file]) to report anonymously.

SNL personnel reporting a potential past waste release site should inform their managers of the existence of the site if SNL personnel are working in or near the area.

*REFERENCES

Requirements Source Documents

10 CFR 835, *Occupational Radiation Protection.*

Related Documents

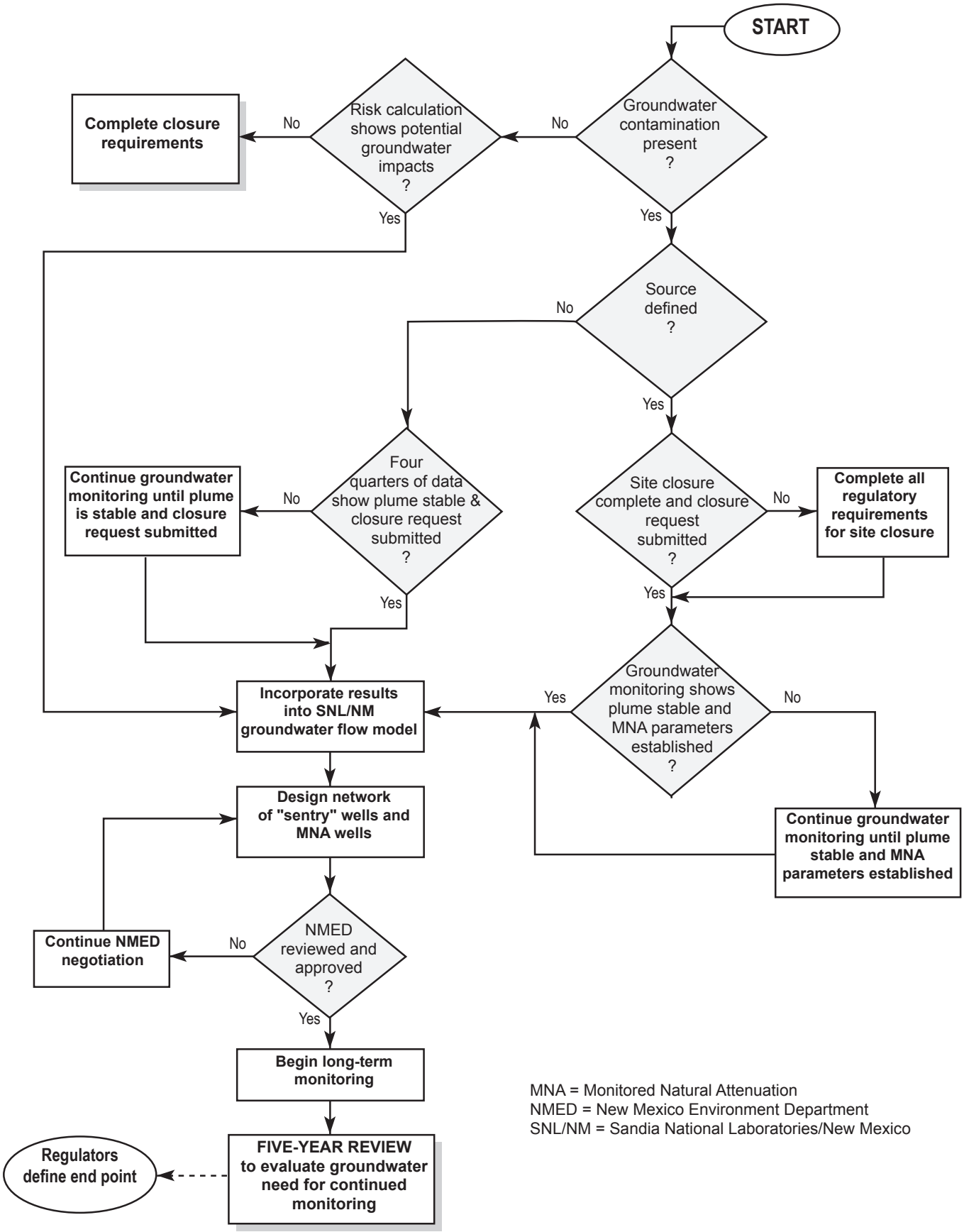
29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response.*

DOE 5400.1, *General Environmental Protection Plan.*

DOE/AL, *Comprehensive Environmental Assessment and Response Program Phase I: Installation Assessment*, draft, DOE/AL, Environment, Safety and Health Division, Albuquerque, NM, September, 1987.

APPENDIX G
Long-Term Decision Logic Process for Monitored Natural Attenuation of Groundwater

LONG-TERM DECISION LOGIC PROCESS FOR MONITORED NATURAL ATTENUATION OF GROUNDWATER



MNA = Monitored Natural Attenuation
NMED = New Mexico Environment Department
SNL/NM = Sandia National Laboratories/New Mexico

APPENDIX H
Example Uncertainty Management Matrix for Long-Term Environmental Stewardship

Table H-1. Example Uncertainty Management Matrix for Long-Term Environmental Stewardship

Expected Condition	Reasonable Failure	Probability of Occurrence	Time to Respond	Impact	Monitoring Plan	Contingency Plan
Cover prevents infiltration and subsequent leachate development.	Burrowing animals or plant roots will breach cover integrity.	High. Operations of other landfills indicate that over time this is a common intrusion scenario.	Short for animals. In the case of plants, it takes time to establish a deep root system.	Significant since cover integrity will be lost and leachate is likely to carry contaminants to the groundwater.	Site inspection every 3 months to ensure integrity of cover.	A bio-intrusion barrier could deter burrowing animals. Since lead times are quite short for this pathway, it may be better to install this barrier at the onset (robust design). Plant removal upon detection should mitigate root intrusion.
Access and institutional controls will prevent excavation through cover.	Humans will dig in the area of the landfill, breaching integrity of the cover.	Low. Additional controls (i.e., land use restrictions and a fence) are in place to prevent human intrusion.	Short for direct contact of humans, longer for loss of cover effectiveness with respect to infiltration	Same as above. In addition, intrusion into the soil would likely result in dermal contact with radioactive contaminants, posing an unacceptable risk to human health.	Site inspection will include surveillance of cover condition, evaluation of fence integrity and maintenance of land use controls..	Reevaluation of remedy will be conducted if humans breach the integrity of the cover and land use controls are not functional. Options may include more sophisticated fence designs, site security, and armoring
Contaminants in the groundwater will naturally attenuate to levels below Maximum Contaminant Levels (MCLs) within a 20-year timeframe.	Contaminants do not attenuate naturally to levels below MCLs within the required timeframe.	Low. Based on modeling of site conditions, contaminant characteristics, and the general trend established by existing monitoring data, MCLs will be attained within a 20-year time frame.	Long. Monitoring data will indicate if the current trend in contaminant reduction changes. Based on these data, the site manager will have advance warning if end objectives will not be met in 20 years.	High. If groundwater remediation cannot be reached in 20 years, regulators will require a different more costly remediation approach. 2. Low. Land use restrictions and alternate drinking supply prevent ingestion.	Wells within the plume will be sampled every three months to ensure that natural attenuation is reducing contaminant concentration. Sentinel wells will be monitored quarterly to detect any escape near receptor wells.	If data indicate significant negative deviation from predicted trends in plume concentrations, an extraction type of remedy

APPENDIX I
SNL/NM Environmental Restoration Project
Long-Term Monitoring Strategy for Groundwater

Click here to view Appendix I.

APPENDIX J
Information Definitions for an LTES IMS

Table J-1. Information Definitions for an LTES IMS

Information Definition	ER Records	GIS	IMS Plan	Institutional Controls Plan	Monitor Control Plan	Site-Specific EMPs	Appendix	Other	Physical Control Plan	Compliance Information	Public Information	IMS Administration
Environmental Restoration Site Specific Information												
Site Name, Site Number, Operable Unit number	X	X	X	X			X					
Site Location, both descriptive and by X,Y coordinates	X	X	X				X					
Site Map	X	X										
Site Size	X	X					X					
Site Pictures (historical, before, during and after clean-up)	X		X									
Site history, what happened at the site	X											
Site Ownership, land use status, land permit status	X											
What are the COCs?	X											
What levels of COCs remain at the site that represent what risk?	X											
What remediation activities were completed at the site?	X											
What was the basis for the NFA approval?	X											
Primary Site Events: What dates did the site get listed on the RCRA/HSWA/CERCLA permit?	X											
When was the site investigated and remediated?	X											
When was the site petitioned and approved for NFA?	X											
What are the land use restrictions?	X			X			X					
What are the Institutional Controls placed on the site?	X			X								
Provide direct access to primary site documents such as Sampling and Analysis Plans VCM Plans NFA Proposals Statement of Basis NFA grant letters Etc.	X							Potential for future access through records center or internet access				
Provide direct access to GIS data.		X	X									
Provide indirect access to ER Program environmental data collected from the site.	X											
Provide access to site events that occur during LTES.	X		X									
Physical Controls												
What physical controls are needed for what period of time?								To be determined				
What is the frequency of each activity?								To be determined				
Why was this set of physical controls selected?								To be determined				

Refer to footnotes at end of table.

Table J-1. Information Definitions for an LTES IMS (Continued)

Information Definition	ER Records	GIS	IMS Plan	Institutional Controls Plan	Monitor Control Plan	Site-Specific EMPs	Appendix	Other	Physical Control Plan	Compliance Information	Public Information	IMS Administration
How and when are controls maintained and periodically inspected?								To be determined				
Under what conditions will these controls be modified or abandoned?								To be determined				
Provide results of inspections and other physical control maintenance activities.								To be determined				
Monitoring												
What monitoring activities are required at what frequency?								To be determined				
What monitoring activities are required for what period of time?								To be determined				
What is the frequency of each activity?								To be determined				
Under what conditions will these activities be modified or abandoned?								To be determined				
Why was this particular set of monitoring activities selected?								To be determined				
How and when are monitoring activities audited for effectiveness and completeness?								To be determined				
Provide results of audits and other monitoring activities.								To be determined				
Compliance and Reporting												
Provide access to ongoing monitoring data collected at the site.								To be determined				
For each site describe any compliance activities required.								To be determined				
Track and report institutional control maintenance and monitoring events to document compliance.								To be determined				
Track and report the nature and frequency of regulatory compliance activities and corrective measures implemented at sites.								To be determined				
Public Outreach (Tracking)								To be determined				
Track, record and report public participation events and activities that allow the public to provide input into ongoing LTES activities.	X		X					To be determined				
What monitoring activities are required for what period of time?								To be determined				
LTES IMS Maintenance and Administration												
Track and report when data calls occur.			X					To be determined				

Refer to footnotes at end of table.

Table J-1. Information Definitions for an LTES IMS (Concluded)

Information Definition	ER Records	GIS	IMS Plan	Institutional Controls Plan	Monitor Control Plan	Site-Specific EMPs	Appendix	Other	Physical Control Plan	Compliance Information	Public Information	IMS Administration
Maintain IMS system security.			X									
Maintain and validate data integrity.			X									
Periodic information updates.			X									
Define and implement routine data administration activities.			X									

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.
COC = Constituent of concern.
EMP = Environmental Monitoring Plan.
ER = Environmental Restoration.
GIS = Geographic Information System.
HSWA = Hazardous and Solid Waste Amendments.
IMS = Information Management System.
LTES = Long-term environmental stewardship.
NFA = No further action.
RCRA = Resource Conservation and Recovery Act.
VCM = Voluntary Corrective Measure.

APPENDIX K
February 15, 2001 Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

This understanding is made between the Environmental Restoration for Project Closure Dept. 6135 and Environmental/Emergency Mgt. Dept. 7131 to document activities that will take place between the organizations in preparation for an ultimate transition of some LTS responsibilities from Environmental Restoration to Dept. 7131. The areas that this Memorandum covers include both Groundwater Monitoring and the ER Data Management System. Also to be discussed and coordinated is the ER Geographical Information System (GIS), however it is not known if the GIS will transition to Dept. 7131. The goal of the discussions is to lead to a detailed plan for the orderly transition of these areas from ER to LTS. The plan will cover basic operations, budgets and schedules, and it will be incorporated into the overall Long Term Stewardship plan that will be submitted to DOE for its ultimate approval.

Dick Fate, 2/15/01
Dick Fate, 6135

Sue Collins
Sue Collins

Jerry Peace
Jerry Peace

Gary Bailey
Gary Bailey

Denise Bleakly
Denise Bleakly

James L. Yeager 2/13/01
Gary Yeager, 7131

Franz Lauffer
Franz Lauffer

Heidi M Herrera
Heidi Herrera

APPENDIX L
Public Comments on Draft LTES Plan
August 2001

COMMENTS ON SNL/NM LTS PLAN
NMED DOE OB
8/10/01

In general, the document does not present a plan to conduct LTES. It repeats the reasons to do stewardship that have appeared in other stewardship related documents including the task group reports. Suggest providing action steps to accomplish task group recommendations rather than simply repeating them. For example, begin the monitoring section with the current activities (Sec 2.5), and propose how those might look under LTS (Secs 2.6 & 2.7). The plan should be written in a manner of "What's in place, and here's what we will do. (implementation oriented)"

It appears that SNL may need to return to square one and produce a completely revised LTS plan. This plan should be based on a basic strawman format such as that utilized at the recent Grand Junction LTS workshop and incorporating task group recommendations. Specifically:

I. Purpose and scope of LTS plan, state problem, scope, and objectives.
II. Stewards and/or stakeholders with roles and responsibilities
III. Nature of the LTS plan. Specifically, a GIS based environmental management system which incorporates geographic modeling and analysis, graphic capabilities to demonstrate the conceptual basis for LTS monitoring, data base capabilities, text/data archiving, LTS programmatic detail, and public accessibility
IV. Physical site setting. Site and other functional boundaries, stewardship unit locations, types of units, etc.
V. Site operational history, including photos, ownership, remedial actions
VI. Regulatory framework or requirements
VII. LTS components
    a. Land use planning
    b. Institutional controls
    c. Engineered systems
    d. Surveillance activities
    e. Corrective action and contingency planning
VIII. Information management system
    a. GIS based graphic site model
    b. Information and records management
IX. Physical surveillance program
    a. Deeds and records maintenance
    b. Site inspections
    c. etc
X. Environmental monitoring program specific to SWMUs, areas, watersheds, etc by media. [Suggest using the organization found in the report to Congress as a basis for the monitoring program (i.e., engineered units, signed and fenced, etc).]
    a. Groundwater
    b. Surface water
    c. Soil
    d. Air
    e. Biota
XI. Project control, including costs, funding, schedules.
XII. Community involvement

The revised plan may include a programmatic plan based on the above outline and an implementation plan, which specifies in detail what parts of the plan are in place and what needs to be done. With a programmatic commitment to LTS the plan can evolve, which is not conveyed in the current document. For example: "Terrestrial Surveillance is currently performed by taking samples of vegetation, soil, etc at XX selected sites on and around KAFB. This will continue under LTES with the addition of sampling locations near selected signed and fenced SWMUs."

Miscellaneous items:

- KAFB/SNL Stewardship integration is a requirement, not a possibility
- LTS needs to be developed and incorporated into current ER decision making, this is not a pass off program after ER is done.
- Plan must demonstrate the multi-layer, multi-agency, redundant planning that is required to assure long term effectiveness.
- The institutional controls section rather well done. It should describe the current land management system currently used by Sandia and DOE. Then state actions to be taken to coordinate this with local government systems.
- The Radioactive Waste Landfill should be included in the "Signed and Fenced Units" category for monitoring and institutional controls purposes.

ROBERT LONG, JR.
MEMBER, LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

In comparison with the DOE LTS Plan Guidance Draft, the following seem to be omitted and should be included in SNL's plan:

(3.0) Why is long term stewardship required?
- Expand history of operations
- Site descriptions; Where are the Class III modification volumes referenced?

A schedule of planned activities is needed, eg. Draft Guidance Section 8:
- When will LTES Plan be revised?
- When will MWL plan be reevaluated?

Section 6.3, funding, does not address the issue appropriately. What are SNL's plans for funding LTES? (Issue 16 belongs here.) How will the issues be resolved?

Section 7: What are plans for FUTURE public involvement?

What are plans for emergency response, corrective actions, contingency plans? (Section 4.6 of Draft Guidance)

Need statement of roles and responsibilities for LTESS (Draft Guidance 9.0, 10.1+)

Include "IMS" is Section 1.6 and/or 8.0

Why include ISSUES in the Draft? The LTES Plan should just provide the answers, not questions.

I recommend following the LTSP Guidance more closely, especially the next version of that document. The Draft version seemed to be pretty good at the LTS Workshop in Grand Junction.

Section 5.3: Omit "Advice from these stakeholders…" Simply state what your plan is, not what was suggested. (This applies throughout the document.)

- Another example page 5-2, Section 5.3 - "After the ER Project is complete" Not needed since that's when LTES begins.
- In same sentence: "SNL/NM will most likely place LTES responsibilities…": Need to be definitive here, recognizing that the plan will be revised to reflect changes.
- Simply state that LTES will be the responsibility of its Laboratories Services Organization (or an organization to be determined.)

Why not start LTES when each site is closed, rather than waiting until ALL sites are closed?

DEB THRALL
MEMBER, LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

You may recall that my most immediate concern at the last public meeting was that the outreach portion of this plan not be postponed until later. I feel that it is of utmost importance that the public be involved with this initiative from the absolute beginning. There is no way that a proposal of this magnitude in terms of the time and commitment that it will take from not only the laboratory but also the community, will be successful if we do not include all the stakeholders in the planning, initiation and implementation stage. I would like to formally reiterate my position that outreach not only be included in the preliminary report, but that it be given a prominent position in the plan. This should be emphasized by you who will carry this forward to Washington. Thank you.

TED TRUSKE
MEMBER, INSTITUTIONAL CONTROLS AND INFORMATION MANAGEMENT TASK GROUP AND LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

Reading the draft LTES report and reflecting on past discussions I'm still convinced that the likelihood of funding for cleanup and stewardship will always be low priority to DOE HQs. Cleanup etc. is not central to the core mission/charter of DOE. In addition it is not really the kind of work that most DOE staff hire on to do.

An option is to have another, or a special agency responsible for cleanup etc. In addition to the raft of problems in creating such an organization, the fact that DOE has the data and the resources, plus the historic responsibility means that DOE would have to have major participation in a kind of "service provider" role to support the agency with the funding responsibility. These realities are compounded by the sad reality that cleanup will never be foremost in the concerns of most citizens, and as a result not a major concern to the Congress and various Congressional offices.

I don't see any prospect of things getting better, especially with the Bush administration posture on environmental issues. I suppose I am just disheartened that we have these issues, just picking at the scab of "if only things had been done differently by the AEC/DOE in the past." It does not help that the same thoughts of things could be better "if only" come to mind about government and the world in general.

DENISE BLEAKLY
MEMBER, TECHNICAL STAFF AT SANDIA NATIONAL LABORATORIES
CHAIR, INSTITUTIONAL CONTROLS AND INFORMATION MANAGEMENT TASK GROUP

1. Upon review of Table A-1 in the Appendix A. ER Sites 55 (Red Towers Site) and 87 (Bldg. 9990 Firing Site) are large areas with surface Du contamination.

   These sites are risked-based sites. However, there was no discussion anywhere in the document about how or when these sites would be monitored for surface Rad contamination. Likewise, there was no discussion about if the risk levels were exceeded for Du what type of clean-up activities would be undertaken.

2. I am very concerned that sites like these will fall through the cracks and not be monitored adequately.

ROGER KENNETT
HEAD OF THE DOE OVERSIGHT BUREAU AT SANDIA NATIONAL LABORATORIES
MEMBER, LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

1. Use the Issues Boxes to do a gap-analysis i.e. what do we have in place that comes close, what we plan to do to close gap, and what is out of our control.

2. The use of the word “should” makes the document sound like previous ones like DOE’s “LTS Study”. Using more active words like “we will have a program to periodically evaluate changes in soil concentrations”.

3. Follow site groupings from NDAA report to describe escalating monitoring needs. (The Info. Mgmt. Section uses it)

CRAIG RICHARDS
MEMBER, INSTITUTIONAL CONTROLS AND INFORMATION MANAGEMENT TASK GROUP AND LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

As a resident of Albuquerque, and a member of two of the LTES working groups, this brief note contains my reaction to the draft plan dated August 2001. The draft plan shows the results of many months of hard work by ABQ citizens, DOE officials, and SNL program managers/staff. The August 2001 draft plan represents a very good start for the LTES program. However, I am very concerned that the LTES program may now be headed in the wrong direction. In general, my concern focuses on the public participation/input part of the LTES program.

Specifically, I believe the LTES draft plan needs to be changed as follows:

1. Move/incorporate the task groups' reports (content) up into the appropriate sections of the draft plan (rather than be appendices), and then show in each section how it responds to the task group's concerns/suggestions/values.

2. Explicitly and officially state in the report that DOE & SNL are committed to working with the interested members of the public as equal partners in every aspect/discussion/decision of the LTES program as it unfolds in the future.

3. Clearly and unequivocally declare in the report that DOE & SNL have abandoned the "business as usual" approach that stresses easy administration/oversight with "to do" and "punch lists" and they have replaced it with a programmatic approach that emphasizes innovative, practical, common sense choices/solutions over time that fully incorporate public values and concerns as they (and their public partners) spend all their time/energy focused on the legacy wastes (SWMUs) and protecting our environment.

My comments respond to the contents and structure of the draft LTES plan that looks like DOE doing business as it has always done with the public input viewed as a necessary process ("the olde way") on a "to do" checklist that needs to be done and checked off. In the past the "olde way" of doing business has resulted in public opposition, lengthy delays, and costly budget overruns for projects such as WIPP/TRUPAC and many others. The public and their concerns were viewed as obstacles to sound science and program management.

The LTES program to be truly successful needs locally designed solutions to whatever the future may present at the SWMUs -- it does not need to have bureaucratic constraints dictated by DOE HQ in Washington, DC. The LTES program needs to step outside its "bureaucratic comfort zone" and to step towards meaningful, purposeful public involvement in all aspects/choices of the program. The LTES program can serve as an innovative "pilot program" that proves citizen partners can facilitate public involvement/acceptance for the program's decisions & actions that implement local community values/concerns and proven technologies in a timely manner ("the new way" of doing DOE business).

JOANNE RAMPONI
MEMBER, LONG TERM STEWARDSHIP MANAGEMENT TASK GROUP

I do want it known how very concerned I am that the Public Outreach is not mentioned more strongly. I realize that in the light of Tuesday (September 11, 2001) everything is relevant. I know that the secrets, etc. are not to be public knowledge, but a little bit of truth in what we are doing with the waste won't hurt.

KIM ONG
RETIRED HYDROLOGIST AND MEMBER, LONG TERM STEWARDSHIP MONITORING TASK GROUP

May I offer the comments below as a former member of the DOE/SNL Citizens' Advisory Board (1998-2000) and a member of the LTES Citizens' Task Group on Environmental Monitoring during the task group's initial deliberations?

I am impressed with the entire LTES Plan and at how quickly this draft was produced. I commend the different task groups and the DOE/SNL staff that contributed to this successful effort. It is my understanding that this plan will be revised and expanded upon as more information is gathered while the ER program is completed at SNL during the next six to seven years.

Including "environmental" in LTES helps to distinguish it from other stewardship programs. May I suggest that the LTES Plan emphasize periodic reviews such as every 5 or 10 years to consider options for further clean up, for excavation or removal of hazardous materials, or the need for LTES at sites because of natural attenuation of hazardous materials?

It may be more reasonable and practical for the LTES plan to set a LTES goal onto a foreseeable future, possibly 100 years. After this time has elapsed, the LTES Plan then should be replaced with a new plan, decisions, or actions based upon the availability of developed technologies for handling wastes, economically and safely, better knowledge and understanding of environmental conditions, and based upon any local stakeholders changed values or needs for the sites.

I am pleased that the LTES Plan addressed monitoring of contaminants through the vadose zone. This effort is needed to access potential contamination to the deep aquifer by volatile organic compounds and to evaluate strategies for extraction of the VOCs from the vadose zone. I suggest that the LTES Plan include scientific geochemical research of contaminant movement through the vadose zone because this process is not adequately understood.

Community Resources Information Office
8338A Comanche Road NE
Albuquerque, New Mexico 87110

February 18, 2003

Michael Zamorski
KAO/Department of Energy
P.O. Box 5400, MS-0184
Albuquerque, NM 87185-0184

Re: Sandia National Laboratories – 30 "No Further Action" Proposals
Comment Period April 29, 2001 to June 29, 2001

Dear Mr. Zamorski:

This letter contains public comments and a general concern for the thirty (30) "No Further Action" (NFA) site proposals presented at the Sandia National Laboratories' (SNL) poster session on May 15, 2001. This letter is based on public group discussions of the individual site proposals. During this review, we used the Community Resources Information Office (CRIO) and its resources. We request a written response to our concern through the CRIO. Also, we request that this letter and any previous Citizens' Advisory Board NFA letters become part of the Long-Term Environmental Stewardship (LTES) report and the CRIO web site for future awareness of all comments and concerns.

As private citizens living in the Albuquerque area, the Community NFA Work Group (CNWG) members became comfortable with the NFA proposals, primarily for two reasons. First, the CNWG reviewed all 30 proposals for (among other things):

- History of Site,
- Completeness of Data and Constituents of Concern,
- Nature and Extent of Site Characterization, and
- Reasonableness of Risk Assessment and Projected Land Use.

Second, the Class III Permit Modification (C3PM) Process was an iterative process that involved independent oversight by the New Mexico Environment Department (NMED). The CNWG members completed their review during four public meetings using poster session information, information binders (Statement of Basis) for each site, and the group members' personal knowledge and expertise. In addition, CNWG members had follow-up discussions with SNL task leaders. The following sections of this letter present the CNWG's consensus recommendation for the NFA site proposals and our general concern with all of the NFA proposals. See Enclosure A for the list of sites.

Results in Brief

In summary, the CNWG was able to develop qualified support for all 30 NFA proposals. However, CNWG support for these proposals must be caveated with a general concern because they contained projected land uses and some data and/or risk uncertainties.

Concern – Future Uncertainties

The CNWG review of these 30 NFA proposals, as a practical matter, worked with projected land uses as key assumptions and with varying levels of data and/or risk uncertainties. We are comfortable with these NFA proposals as presented. However, our expectation is that the Long-Term Environmental Stewardship program will be an enduring process, which will ensure current and projected land uses occur as planned. Further, we expect that any future changes in deed restrictions and known hazards for each site would be handled through the Stewardship process with Public/Community/NMED oversight. Our support diminishes for any NFA proposal if future funding and staffing is reduced for Stewardship and/or NMED.

Respectfully submitted,

Craig D. Richards, Group Leader
Community NFA Work Group

cc: Beth Oms, DOE
James Bearzi, NMED
Will Moats, NMED
Peter Davies, SNL
Group Members

ENCLOSURE A

Assignment List
Thirty (30) Class III Permit Modifications
Scheduled for
No Further Action (NFA's)

Site Number and Name	Operable Unit	NFA Status	CNWG Member
SWMU 6 - Gas Cylinder Disposal Pit	1335	Yes	Diane Terry
SWMU 6A - New Gas Cylinder Disposal Pit	1335	Yes	Diane Terry
SWMU 28-10 - Mine Shafts	1332	Yes	Diane Terry
SWMU 31 - Electric Transformer Oil Spill	1306	Yes	Ted Truske
SWMU 34 - Centrifuge Oil Spill	1306	Yes	Ted Truske
SWMU 36 - HERMES Oil Spill	1306	Yes	Ted Truske
SWMU 37 - PROTO Oil Spill	1306	Yes	Ted Truske
SWMU 51 - Building 6924 Pad, Tank, Pit	1306	Yes	Ted Truske
SWMU 60 - Bunker Area (North of Pendulum Site)	1333	Yes	Bob Long
SWMU 67 - Frustration Site	1332	Yes	Hal Marchand
SWMU 81A - Catcher Box/Sled Track	1333	Yes	Hal Marchand
SWMU 81B - Impact Area	1333	Yes	Hal Marchand
SWMU 81D - Northern Cable Area	1333	Yes	Hal Marchand
SWMU 81E - New Aerial Cable Test Area, Gun Impact Site	1333	Yes	Steve Dapra
SWMU 81F - Scrap Yard	1333	Yes	Steve Dapra
SWMU 82 - Old Aerial Cable Site Scrap	1332	Yes	Bob Long
SWMU 86 - Firing Site (Building 9927)	1335	Yes	Hal Marchand
SWMU 94C - Bomb Burner Area and Discharge Line, Lurance Canyon Burn Site	1333	Yes	Bob Long
SWMU 94G - Scrap Yard, Lurance Canyon Burn Site	1333	Yes	Steve Dapra
SWMU 100 - Building 6620 HE Sump/Drain	1306	Yes	Craig Richards
SWMU 102 - RAD Disposal (East Tech Area 3)	1306	Yes	Steve Dapra
SWMU 111 - Building 6715 Sump/Drains	1306	Yes	Craig Richards
SWMU 113 - Area II Firing Sites	1303	Yes	Steve Dapra
SWMU 117 - Trenches (Building 9939)	1335	Yes	Bob Long
SWMU 141 - Building 9967 Septic System	1295	Yes	Craig Richards
SWMU 151 - Building 9940 Septic System	1295	Yes	Craig Richards
SWMU 160 - Building 9832 Septic System	1295	Yes	Craig Richards
SWMU 191 – Equus Red	1335	Yes	Bob Long
SWMU 228B - Centrifuge Dump Site	1309	Yes	Diane Terry
SWMU 277 - Potential Site in Foothills Test Area	1332	Yes	Diane Terry